You & Technology June-2020

ASPIRE IAS
The Name Associated with Excellence

GOOD MORNING TIMES S&T (JUNE-2020)

You & Technology June-2020

General Studies Paper-3 – S&T – June 2020

.

1) PATENT POOLS

International science collaborations on Covid-19 started a discussion on patent pooling.

• Recently, Costa Rica suggested pooling of rightsto deal with the pandemic through free or minimal, affordable licensing to ensure that the outcomes of efforts can be used by countries with limited economic resources to deal with the problem.

o This proposal received full support, except from the US and the UK.

Patent Pooling

• According to World Intellectual Property Organisation (WIPO), patent pools are defined as an agreement made between two or more patent holders for licensing their patents to one another or any third party for the purpose of sharing their intellectual property rights.

• Generally, patents pools are made for complex technologies which necessitate complementary patents for providing productive technical solutions such as vaccines in the present Covid-19 crisis.

• 'Sewing Machine Combination" of 1856 is considered as the first modern patent pool in the United States.

• Patent pooling structures were actively discussed and considered in response to the SARS outbreak of 2002-03, the H5N1 influenza outbreak of 2005, and the H1N1 influenza pandemic of 2009.

• Patent pooling ensures:

o innovation between companies while minimizing potential legal issues related to the use of other protected concepts.

o lower transaction costs and better process efficiencies as businesses that hold complementary patents can effectively agree not to sue each other for infringement as they work to get new products to the marketplace.

International steps towards patent pooling:

• C-TAP: The COVID-19 Technology Access Pool (C-TAP)(hosted by WHO) compiles pledges of commitment made under the Solidarity Call to Action to voluntarily share COVID-19 health technology related knowledge, intellectual property and data.

India and Patent Pooling:

• The concept of 'patent pooling' is new in India and has been primarily focused to have solutions for the affordable health care.

• Indian Patents Act (IPA), 1970 does not render for any provisions related to formation of patent pools or any guidelines for the same but at the same time it neither restrain for creation or formation of patent pools. o Under IPA, Central Government can set up patent pool by acquiring inventions and patents which are required in the public interest.

• However, in India, patent pooling is viewed as restrictive practice by Competition Act, 2002, which are anticompetitive in nature.

• Medicines Patent Pool (MPP): It has facilitated the development of generic drugs for HIV, tuberculosis, and
hepatitis C, allowing them to be sold at an affordable price.

o MPP is a United Nations-backed public health organisation working to increase access and facilitate
development of life-saving medicines for low- and middle-income countries.

• **Trade Related Intellectual Property Regime (TRIPS):** It allows countries to grant compulsory licences to
companies to produce a patented product at times of emergencies.

• **Nagoya Protocol under Convention on Biodiversity (CBD): Article** 2 (e) of the protocol can be interpreted as
including the genetic sequence information that forms the basis for all ongoing research and development
on Covid treatment and prevention.

o Protocol requires the contracting parties to provide options for access and benefit sharing when genetic
resources are used for commercial purposes, which indirectly provides a scope for patent pooling.

India and Patent Pooling:

• The concept of 'patent pooling' is new in India and has been primarily focused to have solutions for the affordable health care.

• Indian Patents Act (IPA), 1970 does not render for any provisions related to formation of patent pools or any guidelines for the same but at the same time it neither restrain for creation or formation of patent pools. o Under IPA, Central Government can set up patent pool by acquiring inventions and patents which are required in the public interest.

• However, in India, patent pooling is viewed as restrictive practice by Competition Act, 2002, which are anticompetitive in nature.

2) Global Partnership on Artificial Intelligence (GPAI)

India joins Global Partnership on Artificial Intelligence (GPAI) as a founding member to support the
responsible and human-centric development and use of AI.

What is GPAI?

It is an international and multi-stakeholder initiative to guide the responsible development and use of AI,
grounded in human rights, inclusion, diversity, innovation, and economic growth.
This is also a first initiative of its type.
GPAI will be supported by a Secretariat, to be hosted by Organization for Economic Cooperation and
Development (OECD) in Paris, as well as by two Centers of Expertise- one each in Montreal and Paris.

Founding members:

Australia, Canada, France, Germany, India, Italy, Japan, Mexico, New Zealand, the Republic of Korea, Singapore,
Slovenia, the United Kingdom, the United States of America, and the European Union.

How this initiative works?

1. It will bridge the gap between theory and practice on AI by supporting cutting-edge research and

applied activities on AI-related priorities.

2. In collaboration with partners and international organizations, GPAI will bring together leading experts
from industry, civil society, governments, and academia to collaborate to promote responsible
evolution of AI.

3. It will also evolve methodologies to show how AI can be leveraged to better respond to the present
global crisis around COVID-19.

How this helps for India?

By joining GPAI as a founding member, India will actively participate in the global development of Artificial
Intelligence, leveraging upon its experience around use of digital technologies for inclusive growth.

What is AI?

Artificial intelligence is the branch of computer science concerned with making computers behave like humans.

AI refers to the ability of machines to perform cognitive tasks like thinking, perceiving, learning, problem
solving and decision making.

3) PLASMA BANK

In a first in India, Delhi government has launched a plasma bank for treating covid19 patients.

About Plasma Bank

• The facility is to be set up at the Institute of Liver and Biliary Sciences (ILBS), and will be made available to government and private hospitals.

• Plasma Bank functions like a blood bank, and has been created specifically for those who are suffering from COVID-19, and have been advised for plasma therapy by doctors.

• Idea is to extract and store plasma from people who have recovered from COVID-19 and give it to someone suffering from the disease.

• Delhi has been using Convalescent Plasma Therapy, an experimental treatment that doctors are using for people with severe coronavirus disease (COVID-19).

• The bank was needed because patients were facing problems accessing blood plasma. It will, however, not be mandatory for patients to contact the bank for plasma therapy.

• Each plasma donation would be used to treat 2 patients. The bank collects 500 ml of plasma, depending on weight.

About Plasma

• Plasma is the liquid portion of blood "yellowish" in color.

• About 55% of blood is plasma, and the remaining 45% are red blood cells (RBC), white blood cells (WBC) and platelets that are suspended in the plasma.

• Plasma serves four important functions in body o Helps maintain blood pressure and volume.

o Supply critical proteins for blood clotting and immunity.

o Carries electrolytes such as sodium and potassium to our muscles.

o Helps to maintain a proper pH balance in the body, which supports cell function.

4) INDIA TUBERCULOSIS REPORT 2020

Union Minister for Health and Family Welfare released the annual India

Tuberculosis Report 2020. Key statistics in report

• Number of cases

o 2.4 million cases of tuberculosis (TB) were reported in 2019 (14% higher than last year) and 79,000 deaths.

o Reduction in number of missing cases to 2.9 lakh cases as against more than 10 lakhs in 2017.

✓ Missing cases refer to the gap between the estimated and notified incident cases. o Provision of HIV testing for all notified TB patients increased from 67% in 2018 to 81% in 2019.

• Treatment

o Due to easy availability of molecular diagnostics, proportion of children diagnosed with TB increased to 8% in 2019 compared to 6% in 2018

o Improvement in treatment success rate is 81% in 2019 (69% in 2018).

o More than 4.5 lakh DOT Centers provide treatment covering almost every village across the country.

• Ranking of states: In 2020, Central TB Division (CTD) introduced a quarterly ranking on TB elimination efforts by all States and UTs.

o In the categories of larger states with more than 50 lakh population, Gujarat, Andhra Pradesh and Himachal Pradesh were awarded as best performing States.

o In the category of smaller states with less than 50 lakh population, Tripura and Nagaland were awarded.

o In the category of Union Territory, Dadara and Nagar Haveli, and Daman & Diu were chosen as the best performers.

Key initiatives and achievements

• National Strategic Plan (2017-2025): It has completed 3 years of its implementation. o Under this, India is committed to eliminate TB by 2025, 5 years ahead of Sustainable Development Goal3, 2030.

• Revised National Tuberculosis Control Program (RNTCP): It has been renamed as "National Tuberculosis Elimination Program (NTEP)" to accelerate momentum towards eliminating Tuberculosis in the country by 2025.

o NTEP receives funding from The Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), The World Bank and other donors.

• Early accurate diagnosis being done.

o Ziehl-Neelsen acid-fast staining /Fluorescence Microscopy are the primary tools for diagnosis of patients with Pulmonary Tuberculosis presumed to be drug sensitive.

o Patients at risk of Multi-Drug Resistant TB (MDR-TB) are diagnosed using WHO endorsed rapid diagnostics (WRD) like Cartridge Based Nucleic Acid Amplification Test (CBNAAT) / Line Probe Assay (LPA)/ TrueNAT.

• 700 TB Forums have been established as part of community-based response for TB to reach the unreached and to support TB patients.

• On-line notification of TB patients through the NIKSHAY portal.

o NIKSHAY is the National TB information system which acts a one-stop solution to manage information of patients and monitor program activity throughout the country.

o It acts as a Surveillance tool under NTEP.

o It provides a National Data repository of TB information for advanced analytics. o It

performs Direct Benefit Transfers to the patients through integration with Public Financial Management System (PFMS).

• India is one of the first countries to adopt the Communities, Rights and Gender Tools developed by the Stop TB Partnership.

o Stop TB Partnership aims to ensure that every TB patient has access to effective diagnosis, treatment and cure. It was founded in 2001 and has its secretariat in Geneva, Switzerland.

• 'TB Survivors to TB Champions' is an important strategy in engaging with TB affected communities.

o A national level standardised training curriculum has been developed for capacity building of TB survivors. 304 TB Survivors have undergone training as TB Champions.

• The TB Sample Transport Network has been widened through support from Department of Post's services for specimen transportation from peripheral health facilities to TB diagnostic laboratories. This will help expand drug susceptibility testing services.

Related information NIKSHAY Poshan Yojana

• Government of India's National Strategic Plan for Tuberculosis Elimination (2017 - 2025) provides direct benefit transfer (DBT) for all TB patients in order to support their nutrition needs and help address the financial burden of tuberculosis for the affected households.

• The scheme is financed by the Government of India, with partial financing provided through World Bank.

• The DBT provides INR 500 per month to notified TB and MDR-TB patients for the duration of their treatment.

5) RT-PCR tests: What it is and how it is done?

Context: Bombay High Court has said all frontline workers, including those who are asymptomatic, in hospitals and containment zones in Vidarbha shall be entitled to be tested for COVID-19 using RT-PCR (Rapid Antibody and Reverse Transcription Polymerase Chain Reaction) method.

What happened?

It was announced based on a public interest litigation (PIL) seeking these tests on medical staff, police personnel and others working with COVID-19 patients.

Need for:

Frontline workers, including doctors, nurses, police personnel, and sanitation workers are performing a "herculean" task by putting their lives at risk to protect the lives of others. They are the warriors and soldiers in this process. Therefore, these workers are covered under the definition of suspected cases and hence, should be tested.

How RT-PCR is used for detecting Covid-19?

The causative agent for Covid19 is the SARS-CoV-2 virus. It is an RNA virus, that means it infiltrates a healthy cell to multiply and survive.

Thus, the RT-PCR test is for the identification of SARS-CoV-2 RNA. In this, the RNA is converted to DNA through a process called 'reverse transcription' for detecting viruses.

How it is carried out?

The SARS-CoV-2 RNA is generally detectable in respiratory specimens during the acute phase of infection.

1. For that upper and lower respiratory specimens (such as nasal, nasopharyngeal) are collected.
2. This sample is treated with several chemical solutions that remove substances, such as proteins and fats, and extracts only the RNA present in the sample.
3. Real-time RT-PCR setup usually goes through 35 cycles, which means that by the end of the process, around 35 billion new copies of the sections of viral DNA are created from each strand of the virus present in the sample.
4. As new copies of the viral DNA sections are built, the marker labels attach to the DNA strands and then release a fluorescent dye, which is measured by the machine's computer and presented in realtime on the screen. The computer tracks the amount of fluorescence in the sample after each cycle.

When the amount goes over a certain level of fluorescence, this confirms that the virus is present.

6) What is OTT (over-the-top) streaming?

Majority producers in the Malayalam film industry declared that they do not prefer online release for their movies amid COVID-19 outbreak.

What's the issue?

As the theatres remain closed amid the pandemic, the release of many movies were postponed for over three months. Following this, a few producers announced OTT release for their movies.

The announcement irked theatre owners and they declared that they will boycott movies of the producer and actor if they go with the online release.

WHAT IS OTT?

An "over-the-top" media service is any online content provider that offers streaming media as a standalone product. The term is commonly applied to video-on-demand platforms, but also refers to audio streaming, messaging services, or internet-based voice calling solutions.

OTT services circumvent traditional media distribution channels such as telecommunications networks or cable television providers.

As long as you have access to an internet connection — either locally or through a mobile network — you can access the complete service at your leisure.

WHY USE OTT?

1. High-value content at low cost.
2. Original content like Netflix and Amazon prime.
3. Compatibility with multiple devices.

7) What is the ELISA-based Antibody Test?

The Indian Council of Medical Research (ICMR) has advised the States to conduct sero-surveys to measure the coronavirus exposure in the population using IgG ELISA Test.

Significance:

As per the direction of the council, the coronavirus (COVID-19) exposure in the general population as well as in high-risk populations would be measured and the outcome will help "decide the future course of action against the pandemic".

What is an ELISA-based test?

The Enzyme-Linked Immunosorbent Assays (ELISAs) based test is used for the detection of antibodies that are produced by the body to fight against antigens or foreign substances.

How is it carried out?

ELISA-based tests are blood-based tests, which have high sensitivity and specificity.

1. The test involves drawing the blood of the person.
2. The sample is then placed inside the small wells of an ELISA plate.
3. These plates are coated with the antigen or the inactivated form of the virus.
4. If the blood contains antibodies, it binds to the antigen and a substrate solution is added to the well.
5. The reaction usually produces a colour change, thus detecting antibodies.

What is IgG?

Immunoglobulin G (IgG) is an antibody.

The body produces Immunoglobulin M (IgM) and IgG antibodies to fight against a pathogen.

1. The IgM antibodies are produced in four-seven days after pathogens enter the body.
2. The IgG antibodies are produced between 10-14 days of the pathogen's appearance. If the IgG antibody is detected, it can be concluded that the person was exposed to SARS-CoV-2.

How is it different from rapid antibody kits and RT-PCR tests?

ELISA is also a form of a rapid test. However, other rapid antibody test kits are point-of-care and use a finger prick method to draw blood. They take much lesser time and do not need a laboratory process to detect antibodies.

Both, ELISA-based tests and point-of-care tests are not used for confirming Covid-19 infection and are only used for surveillance purpose.

Those who test positive using these tests are usually tested with RT-PCR tests.

• RT-PCR tests are considered as the gold standard for confirming the presence of SARS-CoV-2.

• RT-PCR is a time consuming, lab-based test and involves the collection of throat and nasal swabs and is not a blood-based test.

8) INDIAN NATIONAL SPACE PROMOTION AND AUTHORIZATION CENTRE (IN-SPACE)

Government of India has created Indian National Space Promotion and Authorization Centre (IN-SPACe) to boost private sector participation in entire range of space activities.

About IN-SPACe

• It is the new entity of the Department of Space which will have its own chairperson and board.

o It will regulate and promote building of routine satellites, rockets and commercial

launch services through Indian industry and startups.

o It will have its own directorates for technical, legal, safety and security, monitoring and activities promotion.

• It will act as an interface between ISRO and private parties, and assess how best to utilise India's space resources and increase space-based activities.

o It will function autonomously and parallel to ISRO.

o Indian Space Research Organisation (ISRO) will remain the basic body that decides what missions are to be undertaken but IN-SPACe will help fill the gaps.

• It is the second space organisation created by the government in the last two years. The first one was New Space India Limited (NSIL) after it was announced in 2019 Budget.

• Key Benefits of IN-SPACe:

o It will provide a level playing field for private companies to use Indian space infrastructure.

o It will also hand-hold, promote and guide the private industries in space activities through encouraging
policies and a friendly regulatory environment.

o It will assess the needs and demands of private players, including educational and research institutions,
and, explore ways to accommodate these requirements in consultation with ISRO.

o It aims to empower private companies in creation of launch vehicles and launch pads with technological
input and consultation from ISRO.

o It will allow ISRO to allocate more time and resources for R&D endeavours.

o It will also enhance the socio-economic use of space assets and activities, including through improved
access to space assets, data and facilities

New Space India Limited (NSIL)

• It is the commercial arm of ISRO with the primary responsibility of enabling Indian industries to take up high technology space related activities.

• It is a wholly owned Government of India company, under the administrative control of Department of Space (DOS).

• NSIL does not replace ANTRIX which still exists and has similar functions.

o Antrix was incorporated as a private limited company owned by Government of India 1992 in as a Marketing arm of ISRO for promotion and commercial exploitation of space products, technical consultancy services and transfer of technologies developed by ISRO.

• NSIL will work with IN-SPACe and enable industry consortia to take on some of the activities of ISRO.

• Major business areas of NSIL are Launch vehicle production, Production and marketing of space based services, Building satellites, Transfer of technology etc.

9) QUANTUM KEY DISTRIBUTION

Recently, a satellite-based communication between two ground stations was activated by entangled-based
quantum key distribution (QKD).

• The communication between two stations more than 1,120 kilometers apart was activated by QKD.

• This was achieved by Micius(also known as the Quantum Experiments at Space Scale),

World's first quantumenabled satellite. Micius was launched by China in 2016.

About Quantum Key Distribution

• QKD is a technique that allows for secure distribution of keys to be used for encrypting and decrypting messages. • In traditional cryptography, the security is usually based on the fact that an adversary is unable to solve a certain mathematical problem.

• In QKD, security is achieved through the laws of quantum physics.

• Two such most important laws are Superposition and Entanglement.

o Superposition means that each quantum bit (basic unit of information in a quantum computer) can represent both a 1 and a 0 at the same time.

o In quantum entanglement, subatomic particles become "entangled" (linked) in such a way that any change in one disturbs the other even if both are at opposite ends of the universe.

• Quantum Satellite serves as source of pairs of entangled photons, twinned light particles whose properties remain intertwined no matter how far apart they are.

About Quantum Technology

• Quantum technology seeks to harness laws of quantum physics, which describe the behaviour of matter and energy at the atomic and subatomic level.

• This is unlike classical physics, in which an object can exist in one place at one time. E.g. classical computers operate using binary physical state, meaning its operations are based on one of two positions (1 or 0).

• Quantum principles will be used for engineering solutions to extremely complex problems in computing, communications, sensing, chemistry, cryptography, imaging and mechanics.

• Some applications of Quantum Technology are:

o Quantum Computing with potential applications in precise navigation for defence and civilian applications, accelerated drug development by accurate chemical simulations etc.

o Quantum metrology to provide more capable means of detecting stealth aircraft, submarines and also mineral exploration and water resource management etc.

Related term: Quantum Supremacy

• It's the point at which a quantum computer can complete a mathematical calculation that is beyond the reach of even the most powerful supercomputer.

• Recently, Sycamore (Google's quantum computer) took 200 seconds to perform a calculation that the world's fastest supercomputer, Summit, would have taken 10,000 years to accomplish.

10) FIFTH STATE OF MATTER

NASA Scientists recently observed the fifth state of matter in space for the first time as part of Bose Einstein Condensates (BEC) Experiments aboard the International Space Station (ISS).

About fifth state of matter

• The existence of Bose Einstein Condensate, also known as the fifth state of matter was predicted by Albert Einstein and Indian mathematician Satyendra Nath Bose in early 1920s. o Solids, liquids, gases and plasma are the other four states of matter.

• BEC is a supercooled gas that no longer behaves as individual atoms and particles, but rather an entity in a single quantum state.
• BECs are formed when atoms of certain elements are cooled to near absolute zero (0 Kelvin, minus 273.15 Celsius).
• When they reach that temperature, the atoms become a single entity with quantum properties, wherein each particle also functions as a wave of matter.
• BECs are extremely fragile and the slightest interaction with the external world is enough to warm them past their condensation threshold.
• This makes it nearly impossible for scientists to study them on Earth, where gravity interferes with the magnetic fields required to hold them in place for observation.
• BEC experiments will help in
o Tests of general relativity o Searches for dark energy and Gravitational waves
o Spacecraft navigation o Quantum mechanics on a macroscopic level
o Prospecting for subsurface minerals on moon and other planetary bodies.

About Plasma – Fourth state of matter

• Plasma is like a gas, but comprised of positive ions and free electrons with little or no overall electric charge.
• Because of presence of charged ions, plasma is highly electrically conductive and responds strongly to magnetic and electric fields (unlike gas).
• Plasmas have no fixed shape or volume, and are less dense than solids or liquids.
• Plasma is the most common state of matter in the Universe comprising more than 99% of our visible universe.
• Plasma occurs naturally in sun, the core of stars, quasars, Xray beam emitting pulsars and supernovas.
• On Earth, plasma naturally occurs in flames, lightening and the auroras.
• Plasmas can be formed by heating a gas to high temperatures, as, when heated, the atoms in the gas either gain or lose electrons (ionization).

11) NASA's Gateway Lunar Orbit outpost

NASA recently finalised the contract for the initial crew module of the agency's Gateway lunar orbiting
outpost.
The contract, which is worth $187 million has been awarded to Orbital Science Corporation of Dulles, Virginia,
which is a wholly-owned subsidiary of Northrop Grumman Space.

What is the contract for?

NASA has issued this contract to design the habitation and logistics (HALO) support for the Gateway, which is
a part of NASA's Artemis program that aims to send the first woman and the next man to the Moon by 2024.
The HALO refers to the pressurised living quarters where astronauts will spend their time while visiting the
Gateway.
These quarters will be about the size of a small apartment and will provide augmented life support in tandem
with NASA's Orion spacecraft.

What is NASA's Gateway Lunar Orbit outpost?

The Gateway is a small spaceship that will orbit the Moon, meant for astronaut missions to the Moon and later, for expeditions to Mars.

It will act as a temporary office and living quarters for astronauts, distanced at about 250,000 miles from Earth.

The spaceship will have living quarters, laboratories for science and research and docking ports for visiting spacecraft.

Compared to the ISS, the Gateway is much smaller.

How long will it take to build the Gateway?

As of now, NASA has targeted the completion of the Gateway for 2026, while work on the spaceship is already underway.

By 2022, NASA plans to ready the power and propulsion for the spaceship, which will be launched on a partner provided commercial rocket.

What is Artemis?

Artemis– Acceleration, Reconnection, Turbulence and Electrodynamics of Moon's Interaction with the Sun. It is NASA's next mission to the Moon.

Objective: To measure what happens when the Sun's radiation hits our rocky moon, where there is no magnetic field to protect it. Artemis was the twin sister of Apollo and goddess of the Moon in Greek mythology.

12) LiDAR- Light Detection and Ranging

Archaeologists are using LiDAR data to continue their researches amid global pandemic. In this method, they make high-resolution maps using laser light.

What is LiDAR?

It is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth. These light pulses—combined with other data recorded by the airborne system— generate precise, three dimensional information about the shape of the Earth and its surface characteristics.

How it works?

A lidar instrument principally consists of a laser, a scanner, and a specialized GPS receiver. Airplanes and helicopters are the most commonly used platforms for acquiring lidar data over broad areas. LiDAR follows a simple principle — throw laser light at an object on the earth surface and calculate the time it takes to return to the LiDAR source. Given the speed at which the light travels (approximately 186,000 miles per second), the process of measuring the exact distance through LiDAR appears to be incredibly fast.

Challenges with LiDAR:

• Can't perform well in fog, rain, snow and dusty weather.

• Struggles to detect a glass wall or door, which is why smartphone manufacturers and self-driving cars makers use LiDAR along with secondary cameras and sensors.

13) Fifth State of Matter

NASA scientists on Earth have collaborated with astronauts on the International Space Station (ISS) to corral the first ever Bose-Einstein condensate (BEC)- the fifth state of

matter- outside of Earth's gravity. The matter has been created in one of the coldest places in the universe- the Cold Atom Laboratory– a device on board the International Space Station (ISS).

Basics- What is a matter, an atom and molecule?

Matter is the "stuff" that makes up the universe — everything that takes up space and has mass is matter. All matter is made up of atoms, which are in turn made up of protons, neutrons and electrons. Atoms come together to form molecules, which are the building blocks for all types of matter. Both atoms and molecules are held together by a form of potential energy called chemical energy.

Five states of matter: There are four natural states of matter: **Solids, liquids, gases and plasma.**

The fifth state is the man-made Bose-Einstein condensates. About **Bose-Einstein condensate:** A Bose-Einstein condensate is so named because its existence was posited almost a century ago by Albert Einstein and Indian mathematician Satyendra Nath Bose. This exotic material only exists when atoms of certain elements are cooled to temperatures near absolute zero. At that point, clusters of atoms begin functioning as a single quantum object with both wave and particle properties.

When was it first created?

BEC was created by scientists in 1995. Using a combination of lasers and magnets, scientists cooled a sample of rubidium to within a few degrees of absolute zero. At this extremely low temperature, molecular motion comes very close to stopping. Since there is almost no kinetic energy being transferred from one atom to another, the atoms begin to clump together. There are no longer thousands of separate atoms, just one "super atom."

Why study BEC?

A BEC is used to study quantum mechanics on a macroscopic level. Light appears to slow down as it passes through a BEC, allowing scientists to study the particle/wave paradox. A BEC also has many of the properties of a superfluid, or a fluid that flows without friction. BECs are also used to simulate conditions that might exist in black holes.

Why is it easy to create BEC in space?

BECs have been produced in a variety of experiments on Earth since 1995, but these are hindered by gravity, which collapses the clouds in a split second.

.

.

You & Technology June-2020

ASPIRE IAS UPCOMING EXCLUSIVE sessions FOR MAINS-2020 (Online & Offline)

1. Geography OPTIONAL and RRVAP (Rapid round value addition programme with TEST SERIES)

- For the last 5 years favourite programme among students.
- Where you are lacking we are working upon like, Paper-2 in contemporary and geographical manner, Mapping and its application, special emphasis on Thoughts-Regional planning and biogeography.
- Full coverage of geography with writing skill development
- 2013 when the average score was 140 in Geo our students scored 200+ (Isha Dhuna, Nitin Agarwal and Aditya uppal)
- 2014 when average score is 230 our students scored 280-300 (Aditya uppal RANK-19 309 marks)
- Same trend in 2015-18
- Starts after 7 days of PT examination

2. Our best and SUCCESS GRADE course Newspaper analysis and writing skill programme.

** Our TM and most successful programme start 7 days of PT exam with the coverage of last **3 years issues** highly helpful in P-2&3 (Seats are limited). *FOR FRESHERS AS WELL AS THOSE WHO WANT TO SCORE 450+ IN MAINS 2019*

3. Writing skill development, enhancement and management programme.

- Best developed programme to enhance the writing skills at individual level
- Yield a fantastic result: RANK-22 (Saloni Rai) and Rank 1 Nandani others….

33 sessions with same day discussion, feedback and evaluation of the copies.

4. Special batch for ETHICS and 150 CASE STUDIES. (15 days with the guidance to score 110+ by DIRECTOR sir)

5. Geography for GS MAINS

6. Sociology, political science and Public administration full course and crash course with writing skills.

7. Ncert Foundation btach.

8. GS-FOUNDATION batch for 2021….

All the Best to all my Economics students…
Hope this material will help you.
God bless...JAI Hind

You & Technology June-2020

All the Best
Jai Hind ☺