SCIENCE – Part I

1. GENETIC CROPS

Genetically modified crops (GM Crops) are plants used in agriculture, the DNA of which has been modified using genetic engineering methods. In most cases, the aim is to introduce a new trait to the plant which does not occur naturally in the species.
GMO crops in India:
GM Soybean GM Maize GM Cotton

2. LIDAR

LIDAR is a surveying method that measures distance to a target by illuminating the target with pulsed laser light and measuring the reflected pulses with a sensor.

3. 4G. 5G

4G is the fourth generation of broadband cellular network technology.
LTE: Long Term Evolution is a standard for high speed wire-less communication
5G: it will be 1000 times faster than 4G 1000GB/sec

4. LI FI

It is Light based Wi Fi
Li-Fi is a bidirectional, high- speed and fully networked wireless communication technology similar to wi-fi.
The term was coined by Harald Haas
It is a form of optical wireless communication and uses visible spectrum as well as ultraviolet and infrared radiation
Li-Fi could be a complement to RF communication (cellular networks)
LED bulb can be used to send and receive data and can light a room

5. GREEN PLANTS

Green plants make their own food. Animals (including humans) cannot synthesize food and they feed on either plants or other animals. In all cases the food for animals comes directly or indirectly from plants.

6. MARS MISSION

Mangalyaan
Launch date 5.11.2013 ISRO
Mars orbital 24.9.2014
Space probe orbiting Mars since 24.9.2014
ISRO has become the fourth space agency to reach Mars.
Other three are NASA, Soviet space Program and the European Space Agency.
First nation to do so in first attempt
It carries five instruments
Mission – Building capabilities, explore morphology, mineralogy and Martian atmosphere using indigenous scientific instruments.
Mangalyaan-2 planned between 2018-2020

7. GRAPHENE

Graphene is obtained from Graphite. Graphene is stronger than steel, conducts electricity better than copper and is so light and flexible.
Graphene was discovered in 2004 by two British scientists who used Scotch tape to extract atom thin layers of pure carbon from flakes of graphite.
Market for Graphene is emerging fast.

It can have commercial uses from batteries and touch screens to smart clothing and building material.
Graphene can conduct electricity even in strands one atom thick. Using it in lithium ion batteries could significantly increase the charging capacity and power life. That in turn would make more viable electronics of every kind from Apple's I phones to Tesla's electric cars.

8. GRAVITATIONAL WAVES

Researchers analysing laser interferometer Gravitational Wave Observatory data have confirmed the second instance of gravitational waves recorded in Dec 2015.The faint ripple that eventually reached Earth was produced by the collision of two black holes at half the speed of light, 1.4 billion light years away. First detection was reported in February.

9. DNA 3D NANOPARTICLE

Scientists have developed an algorithm that uses DNA strands to automatically build 3D nanoparticles, which may be used in a large range of applications such as vaccines, gene editing tools and memory storage.
Researchers can build complex nanometre-scale structures of almost any shape and form using strands of DNA.
The algorithm starts with a simple 3D geometric representation of the final shape of the object and then decides how it should be assembled from DNA, according to Mark Bathe associate Professor at MIT.

10. LIGO

The Laser Interferometer Gravitational Wave Observatory (LIGO) is a large-scale physics experiment and observatory to detect cosmic gravitational waves and to develop gravitational wave observations as an astronomical tool.
LIGO INDIA is a planned advanced gravitational wave observatory to be located in India as part of the worldwide network. LIGO India is planned as a collaborative project between a consortium of Indian research institutions and the LIGO laboratory in the USA, along with its International partners Australia, Germany and The UK. The proposal is to move one advanced LIGO detector from Hanford to India. From India, Institute of Plasma Research Gandhinagar, Inter University Centre for Astronomy and Astrophysics IUCAA Pune and Raja Ramanna Centre for advanced Technology Indore.

11. PIXEL

The pixel (a word invented from picture element) is the basic unit of programmable colour on a computer display. Most monitors have hundreds or thousands or millions of pixels that are lit or dimmed to create an image.
Pixel is a single point in a graphic image

12. NEW ELEMENTS DISCOVERED

Four new elements have been added in periodic table.
NIHONIUM Nh 113
MOSCOVIUM Mc 115
TENNESSINE Ts 117
OGANESSON Og 118

13. RED EYE IN PHOTOGRAPHS

A red reflex is produced when the flash of a camera lights up the blood-rich retina.

14. THEORY OF RELATIVITY

Theory of relativity has two concepts. SPECIAL RELATIVITY and GENERAL RELATIVITY.

Special relativity- the speed of light in vacuum is the same for all observers regardless of their relative motion or of the motion of the light source.

Two events simultaneous for one observer may not be simultaneous for another observer if the observers are in relative motions.

Moving clocks are measured to tick more slowly than an observer's stationary clock. General relativity- it is theory of gravitation.
Clocks run slower in deeper gravitational wells.
Rays of light bend in the presence of gravitational field

The universe is expanding, and the far parts of it are moving away from us faster than the speed of light.
The theory of relativity is used in GPS system.

15. POTASSIUM BROMATE AND POTASSIUM IODATE

Potassium Bromate and Potassium Iodate are carcinogenic chemicals. They are used in bread making. The All India Bread Manufacturers Association decided to stop the use of these chemicals immediately.

16. SURROGACY

Couples who are unable to conceive after over a year of trying could use procedures called assisted reproductive technologies (ART) to get pregnant. These include intrauterine insemination, IVF, sperm/egg donation and surrogates of gestational carriers (called surrogacy). Surrogacy is when another woman carries and gives birth to a baby for a couple. The child could be the biological child of the couple or in some cases, a sperm or an egg donation is used.

Surrogacy earned a bad name about five years ago in India when in a couple of cases, children born to surrogates were abandoned by their biological parents; the children were left 'stateless'.

In late 2015, India announced a ban on surrogate service to foreign couples. India has ART guidelines but not the law.
Actor Tusshar Kapoor has become a single parent through surrogacy. Law has not been passed so far.

Draft says surrogacy is only for married, infertile couples. In Dec 2011, actor Aamir Khan announced that he and wife Kiron got a son through Surrogacy. Shah Rukh Khan and wife Gauri too had a son using surrogacy.

17. CARBON NEUTRAL

The Indira Gandhi International (IGI) Airport has become Asia-Pacific's only and one of the world's few airports to achieve a carbon neutral status. The announcement in this regard was made by Airport Council International (ACI) during the Airport Carbon Accreditation certificate presentation ceremony to IGI in Montreal, Canada.

18. THREE PARENT BABY

The world's first three-parent baby boy was born in Mexico to a Jordanian couple with the help of a new fertility technique that incorporates DNA from three people in the embryo.

19. SATELLITE

India's latest communication satellite GSAT-18 was successfully launched from the spaceport of Kourou in French Guiana. The satellite was launched on board of heavy duty Ariane-5 VA-231 rocket of Arianespace. It was successfully injected into a Geosynchronous Transfer Orbit (GTO). GSAT-18 was the 20th satellite from ISRO to be launched by the European space agency and overall 280th mission of the Arianespace rocket launcher family.

20. INDRADHANUSH

Mission 'Indradhanush' is a health mission. It aims to immunize all children under the age of 2 years, as well as all pregnant women, against SEVEN vaccine preventable diseases- Diphtheria, Whooping cough, Tetanus, Poliomyelitis, Tuberculosis, Measles and Hepatitis B.

21. GRAVITATIONAL WAVES

When object accelerates, it creates ripples in space-time, just like a boat causes ripples in pond. These space-time ripples are gravitational waves. They are extremely weak so are very difficult to detect.'
Gravitational waves have been detected after 100 years of prediction of their presence by Einstein in 1916.
They will help in study and understanding Black Holes. They will help in study and understanding Black Holes.

The Laser Interferometer Gravitational Wave Observatory is a large scale physics experiment and observatory to detect cosmic gravitational waves and to develop gravitational wave observations as an astronomical tool.
LIGO –Livingston is the sixth longest building in the world each arm 4000m
LIGO INDIA: India is going to have advanced gravitational wave observatory in Aundh, Hingoli district of Maharashtra. INDIGO-Indian Initiative in Gravitational Wave Observations.

22. HARD WATER AND SOFT WATER

Hard water has high mineral content.
It largely has calcium and magnesium carbonates.
Hard water is formed when water percolates through deposits of limestone and chalk. Soft water has less minerals generally (less than 61mg/liter)
Very hard water has more than 180 mg of minerals per liter
Soap doesn't lather in hard water
Hard water causes scaling in pipes and taps
Hard water is not a health hazard. Infact drinking hard water can help body getting calcium and magnesium minerals.
Hard water bathing leaves our skin dry and itchy
Hard water can be made soft by removing calcium ions and magnesium ions from it.
Reverse osmosis system removes the minerals that cause hard water
Rain water and distilled water are soft
Temporary hardness can be removed by boiling of water. Temporary hardness is caused by presence of dissolved bicarbonate minerals (calcium bicarbonate and magnesium bicarbonate
With hard water, soap solutions form a white precipitate instead of producing lather. Synthetic detergents don't form the precipitate with hard water
Calcium and magnesium carbonates tend to be deposited as off-white material in the water pipes, thus chocking them
Washing soda (sodium carbonate) is used as water softener in laundry.
Water softening is used to reduce hard water's adverse effects.

23. pH

A measure of acidity or alkalinity of water
pH stands for potential of Hydrogen
A substance that is neither acidic nor basic is neutral.

The pH scale measures how acidic or basic a substance is.

The pH scale ranges from Zero to 14.
1- very strong acid
7- Neutral
14 - Very strong base/alkaline
Examples: Blood, Water = 7, Milk = 6, Lemon= 2, Baking Soda = 8 , Hand Soap= 9

24. CRT / LCD / LED MONITORS

CRT: is the Cathode Ray Tube. It is a vacuum tube. It contains one or more electron guns. The tube has a phosphorescent screen which is used to display image. Electron beam is targeted towards the screen to create the images.

LCD: 'Liquid Crystal Display' is the technology used for displays in notebook and other smaller computers. LCDs allow displays to be much thinner than Cathode Ray Tube. LCD consumes much less power than LED as they work on the principle of blocking light rather than emitting it. LCD also known as TFT (Thin Film Transistor)

LED: 'Light-Emitting Diode': it is two-lead semiconductor light source. The diode emits light when activated. Electrons get recombined releasing energy in the form of photons.

25. BAGASSE

Bagasse is the by-product of sugar cane processing.
It is the fibrous matter

Bagasse is used as a biofuel and in the manufacture of pulp and building materials.
For each 10 tonnes of sugarcane crushed, a sugar factory produces nearly 3 tonnes of wet bagasse

Molasses is a viscous by-product of the refining of sugarcane into sugar
Molasses is used in the production of citric acid, rum, as an iron supplement, as an additive in livestock feeds
Molasses is also used as a soil additive to promote microbial activity.

26. 3D PRINTING

3D printing is any of various processes in which material is joined or solidified under computer control to create a three-dimensional object, with material being added together (such as liquid molecules or powder grains being fused together).
3D printing has been used in manufacturing, medical & industry.
3D printing is now also used for creating clothing, shoes and eye wear too.

27. SATELLITES

India's ISRO launched 104 satellites from single rocket. On 15th Feb 2017. On board was a 714 kg satellite for earth observation and more than 100 smaller satellites weighing less than 10kg each. Rocket PSLV-C37 was used.

28. SUPER COMPUTERS

A super computer is a computer with a high level of computing performance compared to a general-purpose computer

Performance of a supercomputer is measured in floating-point operations per second instead of million instructions per second

Supercomputer PARAM 8000 (made by CDAC) was launched on July 01, 1991 was first supercomputer of India

India is making a powerful Supercomputer with a capacity of 10 peta flops (1 followed by 15 zeroes of floating point operations per second). A clock speed a million times faster than fastest laptop today.
In India supercomputers are used in Meteorology for Weather Forecasting

29. ANDROID SOFTWARE NAMES

First was Android beta in November 5 2007. Android 1.0 was released in September 2008 Developed by Google and Open Handset Alliance

After 1.1 version Android code names of confectionery-themed and have been in alphabetic order since 2009.

Cupcake, Donut, Éclairs, Froyo, Gingerbread, Honeycomb, Ice-cream sandwich, Jelly bean, Kitkat, Lollipop, Marshmallow, Nougat, Oreo (Version 8) August 21, 2017,

30. MALWARE

Malware is the generic name for computer virus
Malware is the shortened form of malicious software
Malware includes computer viruses, worms, Trojan horses, Spyware and Wannacry
Malware can be deployed remotely
It can be inserted into code, scripts and also other soft wares.
Malware can be used stealing confidential information from your computers
The term Malware was introduced by Yisrael Radai, computer scientist

31. SPAM

Spamming is a method of flooding the Internet with copies of the same message.
Most spams are commercial advertisements
Spams are also called Electronic Junk E-Mails
Spams keep coming every day and fills up mailbox

32. WORM

A program that replicates itself and destroys data and files on the computer.
Worms work to eat (destroy) the system operating files.
The eating continues till the drive gets empty.

33. TROJAN

A Trojan horse is a malware that is disguised as legitimate soft ware
Trojans are generally used to steal financial information
Trojan takes over computer's system resources
It makes the files etc. unavailable for working by users
Example: You are not able access Google search

34. KEYLOGGERS

Malware records everything we type on our PC or Laptop

Login names passwords are stolen

Many times, keyloggers are used by corporations to acquire computer usage information

35. WANNACRY

WannaCry malware attacked globally in May 2017.
The attack infected more than 2 Lakh computers
It spread to more than 150 countries including India
It demanded ransom money payment in bitcoin in 28 languages

It was an Encrypting Ransomware programmed to attack Microsoft Windows software

Hackers behind these attacks call themselves as SHADOW BROKERS

Main agencies which got affected: Britain's National Health Service, FedEx

36. INTERNET OF THINGS

The Internet of Things (IoT) is a concept that describes the idea of everyday physical objects being connected to the internet.

In the Internet of Things, the connected devices are able to identify themselves to other devices

It is connecting any device with an ON OFF switch to the internet or each other

Things can be cell phones, coffee makers, washing machines, lamps etc. thus things are able to talk to each other

In 1999. Kevin Ashton coined the term 'Internet of Things'

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