Q.1) The Laser Interferometer Gravitational-wave Observatory (LIGO)-India is a planned advanced gravitational-wave observatory to be located in India as part of the worldwide network. Where is it going to be located?

a) Theni, Tamilnadu
b) Hingoli, Maharashtra
c) Tumkur, Karnataka
d) Sriharikota, Odisha

Q.1) Solution (b)

India's first Laser Interferometer Gravitational-Wave Observatory (LIGO) laboratory will be set up in Aundh in Hingoli district of Maharashtra.

LIGO-India is a planned advanced gravitational-wave observatory to be located in India as part of the worldwide network. The project recently received the in-principle approval from the Indian government. 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 Laser Interferometer Gravitational-wave Observatory (LIGO) project operates three gravitational-wave (GW) detectors. Two are at Hanford in the state of Washington, north-western USA, and one is at Livingston in Louisiana, south-eastern USA. Currently these observatories are being upgraded to their advanced configurations (called Advanced LIGO). The proposed LIGO-India project aims to move one Advanced LIGO detector from Hanford to India. LIGO-India project is envisaged as an international collaboration between the LIGO Laboratory and three lead institutions in the IndIGO consortium: Institute of Plasma Research (IPR) Gandhinagar, Inter University Centre for Astronomy and Astrophysics (IUCAA), Pune and Raja Ramanna Centre for Advanced Technology (RRCAT), Indore. LIGO lab would provide the complete design and all the key detector components. Indian scientists would provide the infrastructure to install the detector at a suitable site in India and would be responsible for commissioning it. The proposed observatory would be operated jointly by IndIGO and the LIGO-Lab and would form a single network along with the LIGO detectors in USA and Virgo in Italy.

Q.2) Consider the statements regarding Cassini Spacecraft

1. It is an unmanned space mission
2. It is the first space probe for the study of Saturn and first to enter its orbit
3. It is a flagship initiative of NASA

Which of the given statements is/are correct?

a) 1 and 2
b) Only 1
c) 1 and 3
d) 1, 2 and 3

Q.2) Solution (b)

Cassini–Huygens is an unmanned spacecraft sent to the planet Saturn. It is a Flagship-class NASA–ESA (EU)–ASI (Italy) robotic spacecraft.

Cassini is the fourth space probe to visit Saturn and the first to enter orbit. It has studied the planet and its many natural satellites.

Cassini has revealed the existence of earth-like geographic features, great lakes of liquid nitrogen gas on Titan's surface. Cassini also found evidence for the existence of Underground Ocean on the moon Enceladus. NASA announced that the spacecraft has found evidence that the underground ocean could sustain some form of life. Cassini has generated a rich volume of data that will fuel scientific study for decades to come.

Q.3) Yoshinori Ohsumi, a Japanese cell biologist was awarded the 2016 Nobel Prize in Physiology or Medicine for his discoveries of mechanisms for autophagy. Consider the following

1. Autophagy is a normal physiological process that deals with destruction of cells in the body.
2. It is also called programmed cell death
3. Understanding the mechanism of autophagy will aid in the fight against diseases like Cancer, Alzheimer's and Parkinson's disease.

Which of the given statements is/are correct?

a) 1 and 2
b) Only 1
c) 1 and 3
d) 1, 2 and 3

Q.3) Solution (c)

The word autophagy is derived from Greek words "auto" meaning self and "phagy" meaning eating. Autophagy is a normal physiological process in the body that deals with destruction of cells in the body.

It maintains homeostasis or normal functioning by protein degradation and turnover of the destroyed cell organelles for new cell formation.

During cellular stress the process of Autophagy is upscaled and increased. Cellular stress is caused when there is deprivation of nutrients and/or growth factors.

Thus Autophagy may provide an alternate source of intracellular building blocks and substrates that may generate energy to enable continuous cell survival.

Autophagy also kills the cells under certain conditions. These are form of programmed cell death (PCD) and are called autophagic cell death**. Programmed cell death is commonly termed apoptosis.**

Autophagy is termed a nonapoptotic programmed cell death with different pathways and mediators from apoptosis.

Autophagy mainly maintains a balance between manufacture of cellular components and break down of damaged or unnecessary organelles and other cellular constituents.

Thanks to Ohsumi and others following in his footsteps, we now know that autophagy controls important physiological functions where cellular components need to be degraded and recycled.

- Autophagy can rapidly provide fuel for energy and building blocks for renewal of cellular components, and is therefore essential for the cellular response to starvation and other types of stress.
- After infection, autophagy can eliminate invading intracellular bacteria and viruses. Autophagy contributes to embryo development and cell differentiation.
- Cells also use autophagy to eliminate damaged proteins and organelles, a quality control mechanism that is critical for counteracting the negative consequences of aging.
- Disrupted autophagy has been linked to Parkinson's disease, type 2 diabetes and other disorders that appear in the elderly. Mutations in autophagy genes can cause genetic disease. Disturbances in the autophagic machinery have also been linked to cancer. Intense research is now ongoing to develop drugs that can target autophagy in various diseases.
- Autophagy has been known for over 50 years but its fundamental importance in physiology and medicine was only recognized after Yoshinori Ohsumi's paradigm-

shifting research in the 1990's. For his discoveries, he is awarded this year's Nobel Prize in physiology or medicine.

Q.4) Millimeter waves are broadcast at frequencies between

a) 10 to 100 gigahertz
b) 20 to 200 gigahertz
c) 30 to 300 gigahertz
d) 40 to 400 gigahertz

Q.4) Solution (c)

Millimeter wave (also millimeter band) is the band of spectrum between 30 gigahertz (Ghz) and 300 Ghz. Researchers are testing 5G wireless broadband technology on millimeter wave spectrum.

Today's wireless networks have run into a problem: More people and devices are consuming more data than ever before, but it remains crammed on the same bands of the radio-frequency spectrum that mobile providers have always used. That means less bandwidth for everyone, causing slower service and more dropped connections.

One way to get around that problem is to simply transmit signals on a whole new swath of the spectrum, one that's never been used for mobile service before. That's why providers are experimenting with broadcasting on millimeter waves, which use higher frequencies than the radio waves that have long been used for mobile phones.

Millimeter waves are broadcast at frequencies between 30 and 300 gigahertz, compared to the bands below 6 GHz that were used for mobile devices in the past. They are called millimeter waves because they vary in length from 1 to 10 mm, compared to the radio waves that serve today's smartphones, which measure tens of centimeters in length.

Q.5) The Atacama Large Millimeter/submillimeter Array (ALMA) is an astronomical interferometer of radio telescopes. It is located in

a) Chile
b) Argentina
c) Brazil
d) Columbia

Q.5) Solution (a)

The Atacama Large Millimeter/submillimeter Array (ALMA) is an astronomical interferometer of radio telescopes in the Atacama desert of northern Chile. Since a high and dry site is crucial to millimeter and submillimeter wavelength operations.

ALMA is an international partnership among Europe, the United States, Canada, Japan, South Korea, Taiwan, and Chile.

Q.6) Consider the following statements regarding LISA Pathfinder Mission

1. The mission aims to calculate the exact distance between Earth and recently fund galaxies.
2. LISA Pathfinder is paving the way for future missions by testing in flight the very concept of gravitational wave detection.
3. LISA Pathfinder is a joint ESA and NASA mission, which also carries a NASA payload.

Which of the given statements is/are incorrect?

a) 1 Only
b) 2 and 3
c) 1 and 3
d) 1, 2 and 3

Q.6) Solution (c)

LISA Pathfinder is paving the way for future missions by testing in flight the very concept of gravitational wave detection: it will put two test masses in a near-perfect gravitational free-fall and control and measure their motion with unprecedented accuracy.

LISA Pathfinder is using the latest technology to minimise the extra forces on the test masses, and to take measurements.

The inertial sensors, the laser metrology system, the drag-free control system and an ultra-precise micro-propulsion system make this a highly unusual mission.

LISA Pathfinder is a European Space Agency mission, which also carries a NASA payload.

Q.7) Consider the following regarding YAWS disease

1. It is a tropical viral disease

2. It affects skin, bones and cartilage
3. It can lead to deformity and disability if left untreated

Which of the given statements is/are correct?

a) 1 and 2
b) 2 and 3
c) 1 and 3
d) 1, 2 and 3

Q.7) Solution (b)

Yaws is a chronic disfiguring and debilitating childhood infectious disease caused by Treponema pallidum subspecies pertenue.

It is one of the first diseases targeted for eradication by WHO and UNICEF in the 1950s. WHO renewed global efforts to eradicate yaws in 2012.

The disease affects skin, bone and cartilage. Humans are currently believed to be the only reservoir, and transmission is from person to person.

Yaws is cured with a single oral dose of an inexpensive antibiotic called azithromycin.

Yaws forms part of a group of chronic bacterial infections commonly known as the endemic treponematoses. These diseases are caused by spiral bacteria of the genus Treponema, which also includes endemic syphilis (bejel) and pinta. Yaws is the most common of these three infections.

The disease is found primarily in poor communities in warm, humid and tropical forest areas of Africa, Asia, Latin America and the Pacific.

Q.8) CHARGE Syndrome is said to affect 1 in 20000 people around the world. Consider the following statements regarding this

1. It is as a result of a rare genetic defect
2. It results in growth retardation
3. It results in coloboma, an eye abnormality that occurs before the birth

Which of the given statements is/are correct?

a) Only 1
b) 1 and 2
c) 2 and 3

d) 1, 2 and 3

Q.8) Solution (d)

CHARGE syndrome is a rare syndrome caused by a genetic disorder.

CHARGE is an abbreviation for several of the features common in the disorder: coloboma, heart defects, atresia choanae (also known as choanal atresia), growth retardation, genital abnormalities, and ear abnormalities.

The pattern of malformations varies among individuals with this disorder, and the multiple health problems can be life-threatening in infancy. Affected individuals usually have several major characteristics or a combination of major and minor characteristics.

Q.9) Consider the following statements regarding Human Pappiloma Virus (HPV) vaccines

1. The vaccine helps in fighting cancer
2. The vaccine offers protection against sexually transmitted Human Papilloma Virus.
3. HPV vaccines are exclusively for Women and Children below 14 years of age

Which of the given statements is/are correct?

a) 1 and 2
b) 2 and 3
c) Only 2
d) 1, 2 and 3

Q.9) Solution (a)

Human papilloma virus (HPV) vaccines are vaccines that prevent infection by certain types of human papillomavirus.

HPV vaccine is important because it protects against cancers caused by human papillomavirus (HPV) infection. HPV is a very common virus; nearly 80 million people—about one in four—are currently infected in the United States. About 14 million people, including teens, become infected with HPV each year

All kids who are 11 or 12 years old should get two shots of HPV vaccine six to twelve months apart. Adolescents who receive their two shots less than five months apart will require a third dose of HPV vaccine.

If your teen hasn't gotten the vaccine yet, talk to their doctor or nurse about getting it for them as soon as possible. If your child is older than 14 years, three shots will need to be given over 6 months. Also, three doses are still recommended for people with certain immunocompromising conditions aged 9 through 26 years.

Q.10) CEPI, Coalition for Epidemic Preparedness Innovations, is a "public-private coalition that aims to derail epidemics by speeding development of vaccines. Consider the following

1. India is a member of CEPI
2. CEPI aims to finance and coordinate the development of new vaccines to contain infectious disease epidemics that are usually neglected
3. Focuses on diseases like Rotavirus, Leprosy, Chikungunya, Middle East Respiratory Syndrome (MERS)

Which of the given statements is/are correct?

a) 1 and 2
b) 2 and 3
c) Only 2
d) 1, 2 and 3

Q.10) Solution (a)

CEPI, Coalition for Epidemic Preparedness Innovations, is a public-private coalition that aims to derail epidemics by speeding development of vaccines

The concept is to develop early phases of vaccines without knowing the details for the form in which the infection will appear, but will still cut down the time to tailor the eventual vaccine to be effective to the epidemic.

CEPI's plan includes preparations for possible outbreaks of Lassa fever, Marburg fever, MERS, SARS, Nipah virus, Rift Valley fever, chikungunya, and others.

It is being funded by the Wellcome Trust, the Bill and Melinda Gates Foundation, the World Economic Forum, the governments of Norway, Germany, Japan and India.

It doesn't focus on diseases that already have adequate attention.

Q.11) Select the correct match of vaccine with its disease

1. BGR-34:: Zika
2. PfSPZ:: Malaria
3. MIP:: Leprosy
4. GSL-5700:: Chikungunya

Select the correct code

a) 1, 2 and 3
b) 2, 3 and 4
c) 2 and 3
d) 1, 2, 3 and 4

Q.11) Solution (c)

GSL-5700- Zika

BGR-34: India's first anti-diabetic Ayurveic drug

Q.12) Consider the following with respect to fundamental forces on Earth

1. The range of Gravitational and Electromagnetic Force are almost equal in nature.
2. Law of Gravitation at the Moon is One-Sixth that at the Earth
3. Gravitational Force is a strong force as compared to Weak Nuclear force.

Select the correct statement/s

(a) Only 1
(b) 1 and 2
(c) 1 and 3
(d) 1, 2 and 3

Q.12) Solution (a)

Range of Gravitational Force- Infinite

Range of Electromagnetic Force- Infinite

Strength of Gravitational Force- 10^-36

Strength of Weak Nuclear Force- 10^-13

The **laws of nature are the same everywhere** in the universe. The acceleration due to gravity at the moon is one-sixth that at the earth, but the **law of gravitation** is the same both on the moon and the earth.)

Q.13) Consider the following

1. Frictional Force
2. Air resistance
3. Viscous Force

The examples of 'Contact Forces' are

a) 1 and 2
b) 2 and 3
c) 1 and 3
d) 1, 2 and 3

Q.13) Solution (d)

Contact force is the force in which an object comes in contact with another object. Contact forces are also direct forces. Contact forces are a something that pull on it. Contact forces are ubiquitous and are responsible for most visible interactions between macroscopic collections of matter. The most common instances of this include friction, normal force, and tension

A non-contact force is a force applied to an object by another body that is not in direct contact with it. The most familiar example of a non-contact force is weight. All four known fundamental interactions are non-contact forces. Contact forces arise also when solids are in contact with fluids. For example, for a solid immersed in a fluid, there is an upward bouyant force equal to the weight of the fluid displaced. The viscous force, air resistance, etc are also examples of contact forces

Gravitational forces, Electromagnetic forces etc are example of non-contact forces

Q.14) Consider the following statements about Graveyard Orbit.

1. It is also called a junk orbit or disposal orbit.

2. It is a super-synchronous orbit that lies significantly below the synchronous orbit.
3. For satellites in geostationary orbit and geosynchronous orbits, the graveyard orbit is a few hundred kilometers above the operational orbit.

Which of the given statements is/are correct?

a) 1 and 3
b) 1 and 2
c) Only 1
d) 1, 2 and 3

Q.14) Solution (a)

A graveyard orbit, also called a junk orbit or disposal orbit, is an orbit that lies away from common operational orbits, typically a supersynchronous orbit well above synchronous orbit.

Satellites are moved into such orbits at the end of their operational life to reduce the probability of colliding with operational spacecraft or generating space debris.

A graveyard orbit is used when the change in velocity required to perform a de-orbit maneuver is too large.

For satellites in geostationary orbit and geosynchronous orbits, the graveyard orbit is a few hundred kilometers above the operational orbit.

Q.15) Consider the following statements about OLED, Organic Light-Emitting Diode

1. In an OLED the emissive electroluminescent layer is a film of organic compound.
2. OLEDs require a backlight and are thinner and more efficient than LCD displays
3. OLED is cheaper than the LCD and other displays.

Which of the given statements is/are correct?

a) 1 and 2
b) 1 and 3
c) 2 and 3
d) 1, 2 and 3

Q.15) Solution (b)

OLED (Organic Light Emitting Diodes) is a flat light emitting technology, made by placing a series of organic thin films between two conductors. When electrical current is applied, a bright light is emitted.

OLEDs can be used to make displays and lighting. Because OLEDs emit light they do not require a backlight and so are thinner and more efficient than LCD displays(which do require a white backlight).

OLED displays are not just thin and efficient - they can also be made flexible (even rollable) and transparent.

OLED vs LCD

An OLED display have the following advantages over an LCD display:

- Improved image quality - better contrast, higher brightness, fuller viewing angle, a wider color range and much faster refresh rates.
- Lower power consumption
- Simpler design that enables ultra-thin, flexible and transparent displays
- Better durability - OLEDs are very durable and can operate in a broader temperature range

Q.16) Consider the following statements about Barren Island

1. It is located in Lakshadweep
2. Barren Island volcano is India's only active volcano

Select the correct statements

a) Only 1
b) Only 2
c) Both 1 and 2
d) Neither 1 nor 2

Q.16) Solution (b)

India's only active volcano — the Barren Island volcano — in the Andaman and Nicobar Islands.

It's the only active volcano along a chain of volcanoes from Sumatra to Myanmar. The 354-metre-high island is the emergent summit of a volcano that rises from a depth of 2,250 m. The small, uninhabited 3-km-wide island contains a roughly 2-km wide caldera (a volcanic crater) with walls 250-350 metres high.

Source: http://www.thehindu.com/news/national/the-barren-islandvolcano-erupts-again/article17369862.ece

Q.17) Consider the following statements about Strait of Hormuz

1. It connects the Red Sea to the Gulf of Aden
2. Yemen lies on the north coast and Djibouti lies on the south coast

Select the correct statements

a) Only 1
b) Only 2
c) Both 1 and 2
d) Neither 1 nor 2

Q.17) Solution (d)

Strait of Hormuz is a strait between the Persian Gulf and the Gulf of Oman. It provides the only sea passage from the Persian Gulf to the open ocean and is one of the world's most strategically important choke points. On the north coast lies Iran, and on the south coast the United Arab Emirates and Musandam, an exclave of Oman.

Source: http://www.thehindu.com/news/international/iran-begins-navy-drill-off-strait-of-hormuz/article17371093.ece

Q.18) Consider the following statements about Sariska Tiger Reserve

1. It is the first tiger reserve in the world to have successfully relocated tigers
2. It is a part of the Aravalli Range

Select the correct statements

a) Only 1
b) Only 2
c) Both 1 and 2
d) Neither 1 nor 2

Q.18) Solution (c)

Sariska Tiger Reserve is a national park and tiger reserve located in the Alwar district of the state of Rajasthan, India. The topography of the protected area comprises scrub-thorn arid forests, rocky landscapes, dry deciduous forests, rocks, grasses and hilly cliffs. This area was a hunting preserve of the Alwar state and it was declared a wildlife reserve in 1955. It was given the status of a tiger reserve making it a part of India's Project Tiger in 1978.

The Sariska Tiger Reserve is a part of the Aravalli Range and rich in mineral resources, such as copper. In spite of the Supreme Court's 1991 ban on mining in the airarea, marble mining continues to threaten the environment.

A notable feature of this reserve are its Bengal tigers. It is the first tiger reserve in the world to have successfully relocated tigers.

Source: http://indianexpress.com/article/opinion/editorials/cat-lessons-man-eater-leopard-sariska-national-park-jaipur-zoo-4542338/

Q.19) Svalbard is an archipelago in the Arctic Ocean under the full sovereignty of

a) Sweden
b) Finland
c) Greenland
d) Norway

Q.19) Solution (d)

Svalbard is a Norwegian archipelago in the Arctic Ocean. Situated north of mainland Europe, it is about midway between continental Norway and the North Pole. The islands of the group range from 74° to 81° north latitude, and from 10° to 35° east longitude. The largest island is Spitsbergen, followed by Nordaustlandet and Edgeøya.

Svalbard is an archipelago in the Arctic Ocean under the full sovereignty of Norway, but is subject to the special status granted by the Svalbard Treaty.

The Svalbard Treaty or the Spitsbergen Treaty, recognises the sovereignty of Norway over the Arctic archipelago of Svalbard, at the time called Spitsbergen. The exercise of sovereignty is, however, subject to certain stipulations, and not all Norwegian law applies. The treaty regulates the demilitarisation of the archipelago. The signatories were given

equal rights to engage in commercial activities (mainly coal mining) on the islands. As of 2012, Norway and Russia are making use of this right.

Uniquely, the archipelago is an entirely visa-free zone under the terms of the Svalbard Treaty.

The treaty was signed on 9 February 1920 and submitted for registration in the League of Nations Treaty Series on 21 October 1920. There were 14 original High Contracting Parties, including: the United States, Denmark, France, Italy, Japan, the Netherlands,Norway, Sweden, and the United Kingdom of Great Britain and Ireland (including British overseas dominions of Canada, Australia, India, South Africa and New Zealand). Several additional nations signed within the next five years before the treaty came into force, including the Soviet Union in 1924 and Germany and China in 1925.

Of the original signatories, Japan was the last to ratify the treaty on 2 August 1925. On 14 August 1925, the treaty came into force. As of 2016, there are 45 parties to the treaty.

Source: http://www.thehindu.com/news/international/arctic-vault-receives-new-seed-deposits/article17362653.ece?homepage=true

Q.20) Recently the United Nation's cultural body UNESCO has added 20 new sites to its network of protected biosphere nature reserves under Man and Biosphere list (MAB). Which of the following statements with reference to MAB list is/are correct?

1. India currently has 10 biosphere reserves under Man and Biosphere list.
2. Great Nicobar is the latest inclusion under the Man and Biosphere list.
3. Spain is the country with the largest number of registered reserves in the MAB list.

Which of the above statement(s) is/are correct?

a) 1 and 2 Only
b) 2 and 3 Only
c) 1 and 3 Only
d) All of the above

Q.20) Solution (c)

The Agasthyamala Biosphere Reserve (ABR) is the latest inclusion under the and Biosphere list. With the addition of the ABR, 10 of the 18 biosphere reserves in the country have made it to the list. Spain is the country with the highest number of reserves in the world, with 48. It is followed by the United States, with 47.

Q.21) Article 51A (a) refers to

1. National Anthem
2. National Song
3. National Flag

Select the correct code:

a) 1 and 2
b) 2 and 3
c) 1 and 3
d) All of the above

Q.21) Solution (c)

According to the Supreme Court, there is no concept of National Song. Article 51A (a), citing the citizens fundamental duties, does not refer to National Song. It only refers to National Flag and National Anthem.

Article 51A (a) mandates that citizens should abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem.

Source: http://www.thehindu.com/todays-paper/theres-no-concept-of-national-song-says-sc/article17323101.ece

Q.22) Consider the following statements about Index of Economic Freedom report 2017

1. It is released by The Heritage Foundation
2. India has been placed in the category of 'moderately unfree' economies
3. The index was topped by Hong Kong

Select the correct statements

a) 1 and 2
b) 2 and 3
c) 1 and 3
d) All of the above

Q.22) Solution (c)

India has been placed in the category of 'mostly unfree' economies, as progress on market-oriented reforms has been uneven

Economic freedom is measured based on 12 quantitative and qualitative factors, grouped into four broad categories, or pillars, of economic freedom:

Rule of Law (property rights, government integrity, and judicial effectiveness).

Government Size (government spending, tax burden, fiscal health).

Regulatory Efficiency (business freedom, labour freedom, monetary freedom).

Open Markets (trade freedom, investment freedom, and financial freedom).

Country Rankings - http://www.heritage.org/index/ranking

Source: http://indianexpress.com/article/business/economy/india-slips-to-143-in-economic-freedom-index-us-thinktank-4527579/

Q.23) The Investment Dispute Settlement Navigator (IDSN) is compiled by

a) World Trade Organization
b) United Nations Conference on Trade and Development
c) World Fair Trade Organisation
d) None of the above

Q.23) Solution (b)

The Investment Dispute Settlement Navigator (IDSN), compiled by the United Nations Conference on Trade and Development (UNCTAD), reviews the number of investor-state disputes arising out of investment treaties twice a year.

Source: http://www.livemint.com/Politics/1L1GGswm0w2c7qfmiVfrZN/Have-treaty-arbitration-cases-hurt-Indias-investmentfriend.html

Q.24) Which of the following states has a 'Ministry of Happiness'?

a) Rajasthan
b) Andhra Pradesh
c) Maharashtra
d) Madhya Pradesh

Q.24) Solution (d)

Bhutan, Venezuela, the United Arab Emirates (UAE) and Madhya Pradesh have a ministry/department for happiness.

Source: http://indianexpress.com/article/opinion/columns/gross-national-happiness-bandwagon-bhutan-uae-madhya-pradesh-4527025/