Q.1) It is a method of inquiry in artificial intelligence for determining whether a computer is capable of thinking like a human being or not. Which method is being referred here?

a) Ebert Test
b) ELIZA
c) Feigenbaum test
d) Turing Test

Q.1) Solution (d)

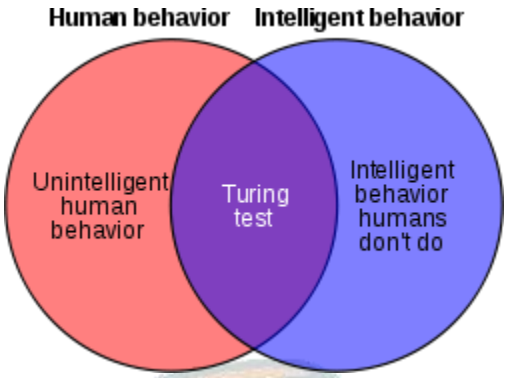
Basic Information:

Statement 1: The Ebert test gauges whether a computer-based synthesized voice can tell a joke with sufficient skill to cause people to laugh. It was proposed by film critic Roger Ebert at the 2011 TED conference as a challenge to software developers to have a computerized voice master the inflections, delivery, timing, and intonations of a speaking human.

Statement 2: ELIZA is an early natural language processing computer program created from 1964 to 1966 at the MIT Artificial Intelligence Laboratory by Joseph Weizenbaum. Created to demonstrate the superficiality of communication between humans and machines, Eliza simulated conversation by using a "pattern matching" and substitution methodology that gave users an illusion of understanding on the part of the program, but had no built in framework for contextualizing events.

Statement 3: Feigenbaum test is also known as subject matter expert Turing test, here an computer system attempts to replicate an expert in a given field such as chemistry or marketing. it was proposed by Edward Feigenbaum in 2003.

Statement 4: there are probabilities that very soon one might fail to distinguish between a robot and a human being. The form of robot that has reached this level can be tested through a method called '**Turing Test'**. A Turing test is a method of inquiry in artificial intelligence for determining whether a computer is capable of thinking like a human being or not. This test is named after Alan Turing (1912-1954), an English computer scientist, cryptanalyst, mathematician and theoretical biologist. This test was was introduced by Turing in his research paper, 'Computing Machinery and intelligence' (1950), He described it calling the 'imitation game'. If an wvaluator is unable to distinguish between machine and human behaviour then it is believed that the machine (AI) has passed the Turing Test.



Q.2) With reference to Nanomicelles, consider the following statements:

1. It can be used for cancer treatments.
2. They are not stable at room temperature, so scientists keep them in specially designed tubes.
3. Nanomicelles are less than 100 nm in size.

Which of the above statements are correct?

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

Q.2) Solution (c)

Basic Information:

With the advance in nanotechnology, researchers across the globe have been exploring how to use nanoparticles for efficient drug delivery.

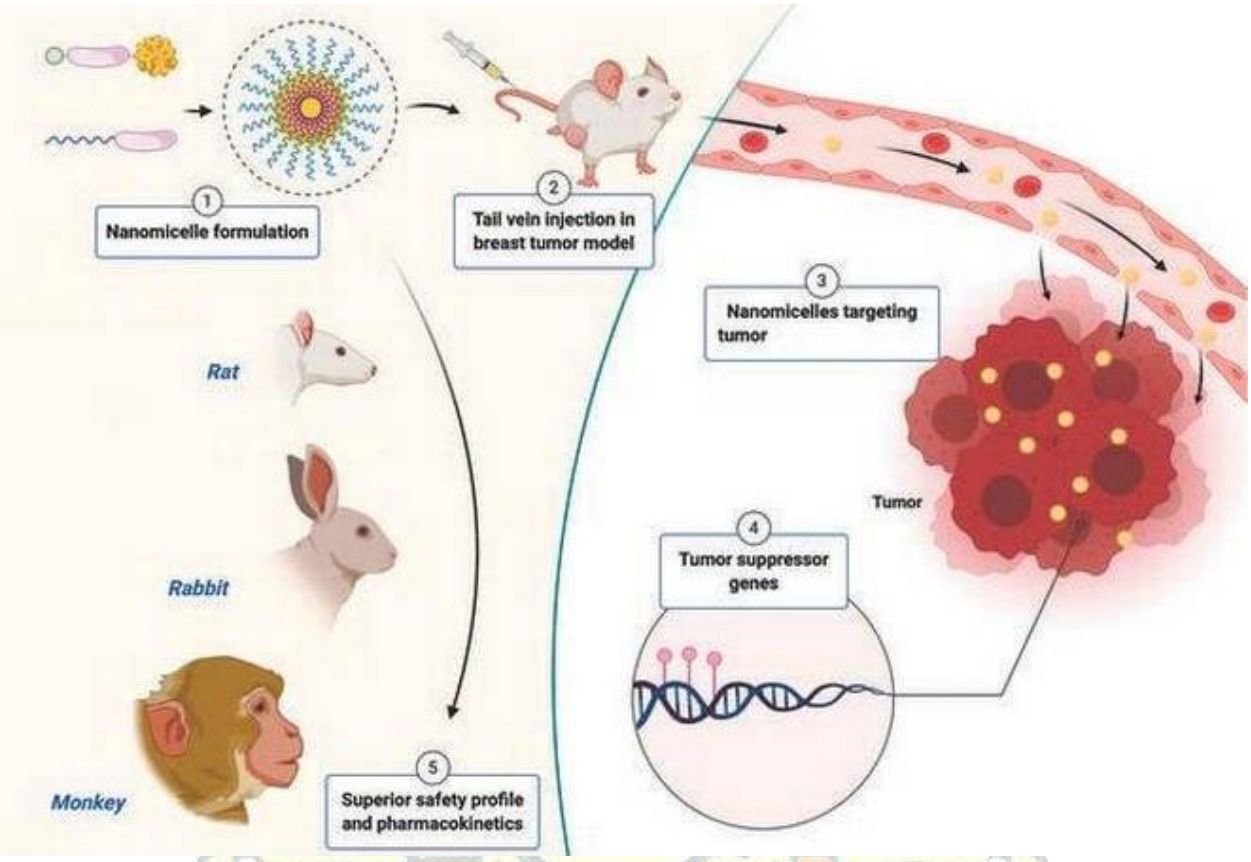
Similar to nanoshells and nanovesicles, nanomicelles are extremely small structures and have been noted as an emerging platform in targeted therapy. Nanomicelles are globe-like structures with a hydrophilic outer shell and a hydrophobic interior. This dual property makes them a perfect carrier for delivering drug molecules.

Statement analysis

Statement 1: The ideal goal for cancer therapy is destroying the cancer cells without harming healthy cells of the body, and chemotherapeutics approved for treatment of cancer are highly toxic. The currently used docetaxel is a highly hydrophobic drug, and is dissolved in a chemical

mixture (polysorbate-80 and alcohol). This aggravates its toxic effects on liver, blood cells, and lungs. Recently a team of scientists has created a **nanomicelle that can be used to deliver a drug named docetaxel, which is commonly used to treat various cancers including breast, colon and lung cancer.**

Statement 2 and 3: The nanomicelles **are less than 100nm in size and are stable at room temperature**. Once injected intravenously these nanomicelles can easily escape the circulation and enter the solid tumours where the blood vessels are found to be leaky.



Picture showing working of nanomicelles.

Q.3) Which of the following statement defines Grey goo?

a) Toxic by-product resulting from the synthesis of graphene.
b) A hypothetical substance composed of out-of-control self-replicating nanobots that consumes all living matter on Earth.

c) A Hypothetical structure that encloses a large urban area under a single roof.
d) A one atom thick sheet of carbon.

Q.3) Solution (b)

Explanation:

One of the more interesting concerns of nanotechnology is 'grey goo.' Grey goo, a nightmarish scenario of nanotechnology in which out-of-control self-replicating nanobots destroy the biosphere by endlessly producing replicas of themselves and feeding on materials necessary for life. The term was coined by American engineer Eric Drexler in his book Engines of CrGrey goo.

Optimists have hailed the positive possibilities of such self-replicating machines. Molecular-level "assemblers" could solve the world's energy crisis through low-cost solar power, cure terrible diseases like cancer by boosting the human immune system, completely clean up the environment, and even enable the restoration of extinct species. The cheapness and abundance of materials, since the basic building blocks of the technology are at the molecular level, would make it easy and cheap to create any product, including incredibly inexpensive pocket supercomputers.

However, pessimists have warned against the possibility of such molecular-level assemblers wreaking havoc because they could spin out of control, could be deliberately diverted to destructive applications, or become so incredibly efficient and intelligent that human oversight or control would become superfluous. Central to this argument is that nanotechnology crucially gives Nano assemblers the ability to reproduce, meaning that it would be a small step from an intelligent robot to a robot species. **Moreover, historical examples of unforeseen consequences of technological innovation, such as the emergence of antibiotic-resistant bacteria or DDT-resistant malarial mosquitoes, have been used to underline the dangers of creating robots, engineered organisms, and nanobots that self-replicate, manifestly multiplying their capacity for destruction of the physical world.**

Q.4) Which of the following country had granted citizenship to a Robot for the first time in world?

a) Japan
b) USA
c) UAE
d) Saudi Arabia

Q.4) Solution (d)

Explanation:

In 2017, there took place an astounding incident in the world of robots **when a gynoid (female android) named Sophia built by Hong Kong based company Hanson Robotics, was granted citizenship by Saudi Arabia.**

Sophia made her first public appearance in March, 2016 in Austin, Texas, USA she had a conversation with the audiences and media personnel and even answered their queries at public shows in overcrowded auditoriums. In October 2017, Sophia was granted citizenship by Saudi Arabia. In November 2017, Sophia was named the United Nations Development Programme's first ever Innovation Champion, and is the first non-human to be given any United Nation title.

Sophia is capable of mimicking body language and facial expression of human beings. She can talk easily on topics like weather. Sophia's innovator and creator David Hanson states that this robot with Artificial intelligence would utilize her citizenship to protect women's Fundamental rights.

Q.5) Consider the following statements with reference to Nano materials:

1. Nanomaterial are materials of which a single unit small sized (in at least one dimension) between 1 and 100 mm.
2. Nanomaterial do not occur naturally, they are artificially made.

Which of the above given statements is/are correctly matched?

a) 1 only
b) 2 only
c) Both 1 and 2

d) Neither 1 nor 2

Q.5) Solution (d)

Basic Information:

Nanotechnologies make use of very small objects or artefacts. Nanomaterials are an increasingly important product of nanotechnologies. Nanomaterials are coming into use in healthcare, electronics, cosmetics and other areas. The number of products produced by nanotechnology or containing nanomaterials entering the market is increasing. Current applications include healthcare (in targeted drug delivery, regenerative medicine, and diagnostics), electronics, cosmetics, textiles, information technology and environmental protection.

Explanation:

Nanomaterials can be defined as materials possessing, at minimum, one external dimension measuring 1-100nm. (Not mm), they may be in the form of particles, tubes, rods or fibres. The definition given by the European Commission states that the particle size of at least half of the particles in the number size distribution must measure 100nm or below.

Nanomaterials can occur naturally, be created as the by-products of combustion reactions, or be produced purposefully through engineering to perform a specialised function. These materials can have different physical and chemical properties to their bulk-form counterparts.

So, both statements are correct here.

Q.6) Consider the following statements about Xenobots?

1. They are living Robots developed by stem cells of Frog.
2. Xenobots can move toward a target and can heal themselves after being cut

Which of the statements given above is/are correct?

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

Q.6) Solution (c)

Explanation:

Scientists in the United States have created the world's first "living machines" — tiny robots built from the cells of the African clawed frog that can move around on their own. They are named after the species of aquatic frog found across sub-Saharan Africa from Nigeria and Sudan to South Africa, Xenopus laevis.

Statement 1: Xenobots are less than a 1 millimeter (0.039 inches) wide and composed of just two things: skin cells and heart muscle cells, **both of which are derived from stem cells harvested from early (blastula stage) frog embryos.**

Statement 2: The xenobots "can move toward a target, perhaps pick up a payload (like a medicine that needs to be carried to a specific place inside a patient) **— and heal themselves after being cut.**

Q.7) Consider the following statements with reference to All India Council for Robotics and Automation:

1. It is autonomous body under Ministry of Science and Technology.
2. It sets up standards in Robotics and Automation and education industry in India.

Which of the statements given above is/are correct?

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

Q.7) Solution (b)

Explanation:

AICRA a not-for-profit organization is the apex body, setting up standards in Robotics & Automation and education industry as well as helping over 35,00+ members organizations and professionals to solve difficult technical problems, while enhancing their leadership and personal career capabilities.

Established in 2014 and ever since, AICRA's relentless pursuit has been to constantly support the Robotics & Automation industry, providing support systems to institutions such as quality assurance, information systems and train-the-trainer (TTT) academies either directly or through partnerships. To strengthen supplementary skill development, **AICRA focuses on fostering**

private sector led efforts that include both non-profit and for-profit initiatives with the goal of building models that are scalable.

AICRA is focused on building the architecture integral to the development of the automation sector through policy advocacy, and help in setting up the strategic direction for the sector to unleash its potential and dominate newer frontiers.

The executive board of AICRA is the senior governing body that's composed of the President, President - elect Secretary, Vice President, Treasurer, 8 members with geographic, technical, and operational experience, the Parliamentarian (non-voting), and up to 5 at-large, competency-based members. The Executive Board works closely with the AICRA staff, made up of dozens of seasoned experts in areas like non-profit management, finance, event planning, marketing, training, publishing and more.

So, Statement (1) is incorrect here.

Q.8) Consider the following pairs:

Robot	**:**	***Country***
1. FEDOR	:	France
2. KIROBO	:	Japan
3. ROBONAUT 2	:	USA

Which of the above given pairs is/are correctly matched?

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

Q.8) Solution (c)

Explanation:

Statement 1: **FEDOR is humanoid robot, the first from Russia**, Originally intended for rescue operations, it was sent on an experimental mission to the International Space Station in 2019. Short for Final Experimental Demonstration Object Research, Fedor can be operated manually by ISS astronauts wearing robotic exoskeleton suits. The robot mirrors their movements.

Fedor stands 180 cm tall and weighs 160 kg. It copies human movements, which will enable it to

perform tasks that are risky for astronauts strapped onto an exoskeleton.

Statement 2: While Fedor is Russia's first robot in space, other countries have previously sent theirs**. In 2011, NASA sent up Robonaut 2, a humanoid developed with General Motors that had a similar aim of working in high-risk environments,** AFP reported. Robonaut 2 was flown back to Earth in 2018 after experiencing technical problems.

Statement 3: **In 2013, Japan sent up a small robot called Kirobo**, developed with Toyota. It was able to hold conversations in Japanese. Kirobo set two Guinness World Records after it returned to Japan, following an 18-month stay on board the International Space Station.

- First companion robot in space
- Highest altitude for a robot to have a conversation

Q.9) Consider the following statements with reference to NASA's Magnetospheric Multiscale Mission:

1. It was launched in December 2020.
2. It recently made the first high resolution measurement of an interplanetary shock.
3. It has set Guinness record for highest altitude fix of a GPS signal.

Which of the statements given above is/are correct?

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

Q.9) Solution (b)

Basic information:

Magnetospheric Multiscale Mission.

It is NASA robotic space mission to study the Earth's magnetosphere, using four identical spacecraft flying in a tetrahedral formation. **It was launched in 2015**. **It investigates how the Sun's and Earth's magnetic fields connect and disconnect, explosively transferring energy from one to the other.** This process occurs throughout the universe and is known as magnetic reconnection. **So, statement 1 is incorrect here.**

It consists of four spacecrafts that orbit Earth to study a lesser known phenomenon called

magnetic reconnection – when magnetic field lines of Earth cross the Sun's magnetic fields and release a burst of energy, reconnection process taps this field energy stored and coverts it into heat and energy in the form of charged particle acceleration and large-scale flows of matter.

The 4 spacecrafts are arranged in a tetrahedral or a pyramid pattern.

Magnetic reconnection is a phenomenon unique to plasma, that is, the mix of positively and negatively charged particles that make up the stars and fill up the space.

Statement Analysis:

Statement 2: **Recently it made the first high resolution measurement of an interplanetary shock.** Interplanetary shocks are a type of collision less shock — ones where particles transfer energy through electromagnetic fields instead of directly bouncing into one another. These collision less shocks are a phenomenon found throughout the universe, including in supernovae, black holes and distant stars.

Statement 3: NASA's Magnetospheric Multiscale mission (MMS) **has set the Guinness World Record for highest altitude fix of a GPS signal— at 70,000km above the surface of the Earth.**

Q.10) Consider the following statements about Global partnership on Artificial intelligence (GAPI)

1. It was founded under the auspices of UN and aims to promote responsible and human centric development of AI.
2. India is among its founding member.

Which of the above given statements is/are correct?

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

Q.10) Solution (b)

Explanation:

GPAI 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 for evolving better understanding of the challenges and

opportunities around AI using the experience and diversity of participating countries. In order to achieve this goal, the initiative will look to bridge the gap between theory and practice on AI by supporting cutting-edge research and applied activities on AI-related priorities**. Launched in June 2020, GPAI is the fruition of an idea developed within the G7, under the Canadian and French presidencies.**

GPAI's 15 founding members are Australia, Canada, France, Germany**, India,** Italy, Japan, Mexico, New Zealand, the Republic of Korea, Singapore, Slovenia, the United Kingdom, the United States and the European Union. They were joined by Brazil, the Netherlands, Poland and Spain in December 2020.

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. **So, only statement (b) is correct here.**

Q.11) What are the potential health effects of nanomaterials?

1. They can lead to genetic damage.
2. They may lead to lung inflammation.
3. They cannot cause brain disease.

Select the correct code

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

Q.11) Solution (a)

Basic Information:

There is experimental evidence of a range of possible interactions with biological systems and health effects of manufactured nanoparticles. In experimental systems in the laboratory they can affect the formation of the fibrous protein tangles which **are similar to those seen in some diseases, including brain diseases. Airborne particles might cause effects in the lungs but also on the heart and blood circulation similar to those already known for particulate air pollution. There is some evidence that nanoparticles might lead to genetic damage, either directly or by causing inflammation.**

All these effects would depend on nanoparticles' fate in the body. Only a minimal amount of

nanoparticle doses escape the lungs or intestine, but long-term exposure could still mean a large number are distributed round the body. Most are held in the liver or the spleen, but some appear to reach all tissues and organs. There may also be entry into the brain via the membranes inside the nose.

Nanotubes or rods with similar characteristics to asbestos fibres pose a risk of the mesothelioma (a form of cancer of the pleura).

Q.12) Which of the following statements about graphene is/are correct?

1. Graphene is the name for a honeycomb sheet of carbon atoms.
2. Graphene consists entirely of carbon atoms.
3. It is harder than diamond yet more elastic than rubber.

Select the correct answer using the code below:

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

Q.12) Solution (d)

Basic information:

Graphene is the name for an atom-thick honeycomb sheet of carbon atoms. It is the building block for other graphitic materials (since a typical carbon atom has a diameter of about 0.33 nanometers, there are about 3 million layers of graphene in 1 mm of graphite).

Units of graphene are known as nanographene; these are tailored to specific functions and as such their fabrication process is more complicated than that of generic graphene.
Nanographene is made by selectively removing hydrogen atoms from organic molecules of carbon and hydrogen, a process called dehydrogenation.

Statement analysis:

Statement 1**: Graphene is the name for a honeycomb sheet of carbon atoms**. Its striking physical, electronic, and chemical properties originate from the two-dimensional (2D) electron confinement within a one-atom-thick layer.

Statement 2**: Graphene consists entirely of carbon atoms** and graphene sheets are building

blocks for other graphitic materials such as graphite, carbon nanotubes and fullerenes. The Nobel Prize in Physics 2010 was awarded jointly to Andre Geim and Konstantin Novoselov "for ground-breaking experiments regarding the two-dimensional material graphene".

Statement 3: **It is harder than diamond yet more elastic than rubber;** tougher than steel yet lighter than aluminium. Graphene is the strongest known material. Graphene possesses other amazing characteristics: Its high electron mobility is 100x faster than silicon; it conducts heat 2x better than diamond; its electrical conductivity is 13x better than copper; it absorbs only 2.3% of reflecting light; it is impervious so that even the smallest atom (helium) can't pass through a defect-free monolayer graphene sheet.

Q.13) Which of the following are features of Indian humanoid robot, Vyommitra?

1. It is half humanoid robot which will be sent into space as part of the Gaganyaan programme.
2. It has been developed by DRDO.
3. It is programmed to speak Hindi and English and perform multiple tasks.

Select the correct code:

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

Q.13) Solution (c)

Basic information:

Before India's first human spaceflight, a half-humanoid will travel solo to help determine if the trip is safe enough. Like any robot, a humanoid's functions are determined by the computer systems to which it is connected. With the growth of artificial intelligence and robotics, humanoids are being increasingly used for repetitive jobs, such as that of a waiter at a restaurant

Explanation:

Statement 1: She is a half-humanoid, her body stops at the torso and has no legs. **She will be sent to space as a part of Gaganyaan Mission which aims to send three Indians in Space by 2022.**

Statement 2: It has been developed by the ISRO Inertial Systems Unit, Thiruvananthapuram, **so statement 2 is incorrect.**

Statement 3: **it is programmed to speak Hindi and English and perform multiple tasks** which includes switching panel operations, ECLSS [environment control and life support systems] functions, be a companion, converse with the astronauts, recognise them and also respond to their queries. She can also detect and give out warnings if environmental changes within the cabin get uncomfortable to astronauts and change the air condition.

Q.14) Which of the following disadvantages are associated with reference to use of nanomaterials?

1. There are still knowledge gaps regarding nanomaterials.
2. They can pollute water bodies.
3. Possible health risks are ingestion exposure and dust explosion hazards.

Select the correct code

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

Q.14) Solution (d)

Basic information

The use of nanomaterials is prevalent in a wide range of industries and consumer products.

In the cosmetics industry, mineral nanoparticles –such as titanium oxide –are used in sunscreen, due to the poor stability that conventional chemical UV protection offers in the long-term. Just as the bulk material would, titanium oxide nanoparticles are able to provide improved UV protection while also having the added advantage of removing the cosmetically unappealing whitening associated with sunscreen in their nano-form.

The sports industry has been producing baseball bats that have been made with carbon nanotubes, making the bats lighter therefore improving their performance. Further use of nanomaterials in this industry can be identified in the use of antimicrobial nanotechnology in items such as the towels and mats used by sportspeople, in order to prevent illnesses caused by bacteria.

Statement analysis:

Statement 1: **there are still knowledge gaps regarding nanomaterials**, meaning the manufacturing process can often be complex and difficult. The overall process is also expensive, requiring optimum results - especially regarding their use in consumer goods - in order to avoid financial losses.

Statement 2: Additionally, Risk-assessments concerning any potential **environmental effects indicate that nanomaterials used in cosmetic items such as sunscreen, which are applied to the skin, run the risk of ending up in aquatic ecosystems after they are washed off**. Nanomaterials that have been engineered may also end up in water bodies such as lakes and rivers, before accumulating to create particles of a larger size. This may put freshwater species - such as snails- at risk by possibly inducing a decline in life processes such as growth and reproduction.

Statement 3: there are number of disadvantages associated with nanomaterial use. Due to the relative novelty of the widespread use of nanomaterials, there is not a large amount of information on the health and safety aspects of exposure to the materials.

Currently, one of the main disadvantages associated with nanomaterials is considered to be inhalation exposure. This concern arises from animal studies, the results of which suggested that nanomaterials such as carbon nanotubes and nanofibers may cause detrimental pulmonary effects, such as pulmonary fibrosis**. Further possible health risks are ingestion exposure and dust explosion hazards.**

Q.15) Consider the following statements with reference to National Artificial Intelligence Portal

1. It has been jointly developed by Ministry of Science and Technology in collaboration with NASSCOM.
2. The portal shall work as a one stop digital platform for AI related developments in India

Select the *incorrect* statements:

a) 1 only
b) 2 only
c) Both
d) None

Q.15) Solution (a)

Explanation:

Incorrect statement is being asked here.

National Artificial intelligence Portal has been jointly developed by the Ministry of Electronics and IT and IT Industry. National e-Governance Division of Ministry of Electronics and IT and NASSCOM from the IT industry will jointly run this portal. **This portal shall work as a one stop digital platform for AI related developments in India,** sharing of resources such as articles, startups, investment funds in AI, resources, companies and educational institutions related to AI in India. The portal will also share documents, case studies, research reports etc. It has section about learning and new job roles related to AI. **So, statement (a) is incorrect here.**

Q.16) Consider the following statements with reference to application of Nanotechnology

1. The Nano CO2 Harvester can capture more CO2 than usual and is more efficient fuel converter.
2. Nanoparticle of silver embedded into fibres have antimicrobial action.
3. Nanoenhanced paints can increase emission of nitrogen oxides, hydrocarbons and carbon monoxide in atmosphere.

Which of the above statements is/are correct?

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

Q.16) Solution (a)

Basic informstion:

Nanotechnology is science, engineering, and technology conducted at the nanoscale, which is about 1 to 100 nanometers. The physical, chemical and biological properties exhibited by a material changes at this size level is unique and peculiar way, i.e. it follows the laws of quantum physics which is very different from the laws of Newtonian physics we see and feel. As nanotechnology allows manipulation of properties at a very small scale, it can have many applications such as:

Explanation:

Application based on nanotechnology:

- Graphene is used in transparent electrodes for solar cell, LCD, robust non-volatile atomic switches, chemical and biological sensors and in spintronic devices.
- Nanowhishkers on clothes create a cushion of air around the fabric so that liquids cannot stain them.
- **Nanoparticles of silver embedded into fibres have anti-microbial action.**
- Silver nanoparticles are incorporated in apparel, footwear, paints, wound dressings, appliances, cosmetics and plastics for their antibacterial properties.
- New and cheap solar cells use nanoparticles of titanium oxide coated with dye molecules to capture the energy of visible light and convert it into electricity.
- **Nanoenhanced paints can reduce emission of nitrogen oxides, hydrocarbons and carbon monoxide in the atmosphere;** addition of nanoparticles make paint scratchproof, easy cleaning, air purifying, UV resistant, water repellent, flame resistant and antibacterial.
- **The Nano CO2 Harvester can capture more CO2 than usual and is more efficient fuel converter.**
- The magnetically charged nanoparticles have been proved potent in researches to have effectively carried on adsorption process to remove heavy & toxic metals, dyes from and oil spills from water bodies.
- They accelerate the conversion of organic waste into organic manures or biogas and fertilizers can also be quickened through use of Nanoparticles (such as Iron oxide particles).

Q.17) National strategy for Artificial Intelligence has been released by

a) Niti Aayog

b) Department of Science and Technology
c) FICCI
d) NASSCOM

Q.17) Solution (a)

Basic Information:

Artificial intelligence is the use of computers to simulate human intelligence. It enables computer system to carry out task on their own that otherwise requires human intelligence. AI amplifies our cognitive abilities — letting us solve problems where the complexity is too great, the information is incomplete, or the details are too subtle and require expert training.

Explanation:

Union Budget-2018 mandated NITI Aayog to come up with a national programme on employing Artificial Intelligence towards national development. **NITI has, since, published a National Strategy for Artificial Intelligence.**

National Strategy lays down the vision of India for evolving a robust ecosystem for AI research and adoption. The Strategy is termed #AIForAll as it is focused on leveraging AI for inclusive growth in line with the Government policy of Sabka Saath, Sabka Vikas.

Aiming to put AI to use for all and across sectors, NITI has identified barriers that needs to be addressed to achieve success in the use of AI. These include lack of expertise, absence of enabling data ecosystem, high resource cost and low awareness, privacy and security issues and absence of collaborative approach to adoption and application of AI.

Q.18) The World's first artificial Human NEON has been created by

a) Google
b) Hanson Robotics
c) Samsung
d) Honda

Q.18) Solution (c)

Explanation:

Neon isn't a robot or a voice assistant like Siri or Alexa. Instead, it's a simulated human assistant that appears on a screen and learns about people to help it give seemingly intelligent and life-

like responses -- think of it like an animated chatbot. Samsung claims the Neons will be able to provide a response to questions in milliseconds.

Neon isn't a voice assistant or a robot, but rather a video chatbot that can learn people's preferences and respond to their queries in an unusually lifelike way, the company claims.

Q.19) Feynman's prophecy is associated with which of the followings

a) Robotics
b) Programmable matter
c) Artificial intelligence
d) Nanotechnology

Q.19) Solution (d)

Explanation:

Scientists are able to see beyond times due to their great powers of imagination. Richard Feynman was one such scientist **who delivered a prophetic talk describing a new field of nanotechnology on 29th December 1959.** The completion of 60 years of this event provides as an occasion to pay tribute to the imagination of one of the greatest minds that led to emergence of one of the most advanced field of science and technology.

Feynman delivered the talk at the annual meeting of the American physical society at the California institute of technology and the title of the talk was **"There is Plenty of Room at the Bottom- An invitation to enter a New Field of Physics."**

The new field of nanotechnology presaged by Feynman in this lecture grew very rapidly in the following decades not only translating Feynman's predictions into reality but also providing several new breakthroughs in this field.

Feynman describe a new bottle is field in his talk - one of manipulating and controlling things on the scale of a nanometre(nm), which is a brilliant part of a metre just for a quantitative feel, ten hydrogen atoms in a line make up 1 nm, a DNA double helix is about 2 nm across, the smallest cellular life forms are around 200 nm in length, the smallest thing that can be seen with unaided human eye is about 10,000 nm across and a human hair is about 50,000 nm thick.

Q.20) With reference to Carbon Nanotubes, consider the following statements?

1. Carbon nanotubes (CNTs) are cylindrical molecules that consist of rolled-up sheets of single-layer carbon atoms (graphene).
2. They have very high current densities with no heat loss
3. They have wide application ranging from paints and textiles to medical diagnostic tools.

Select the incorrect code:

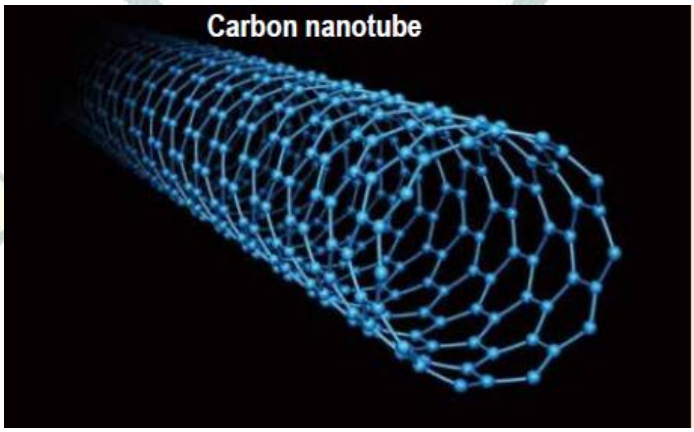
a) 1 and 2 only
b) 2 and 3 only
c) 3 only
d) None

Q.20) Solution (d)

Explanation:

Carbon nanotubes (CNTs) are cylindrical molecules that consist of rolled-up sheets of single-layer carbon atoms (graphene). They can be single-walled (SWCNT) with a diameter of less than 1 nanometre (nm) or multi-walled (MWCNT), consisting of several concentrically interlinked nanotubes, with diameters reaching more than 100 nm. Their length can reach several micrometres or even millimetres**. Carbon nanotubes are used in products ranging from paints and textiles to medical diagnostic tools.**

There are numerous carbon nanotubes properties and applications which take full advantage of CNTs unique properties of aspect ratio, mechanical strength, electrical and thermal conductivity.



Carbon Nanotubes Properties

- their mechanical tensile strength can be 400 times that of steel

- **They have very elastic strength alongside low mass densities or very high current densities with no heat loss.**
- they are very light-weight – their density is one sixth of that of steel;
- their thermal conductivity is better than that of diamond;
- they have a very high aspect ratio greater than 1000, i.e. in relation to their length they are extremely thin;
- a tip-surface area near the theoretical limit (the smaller the tip-surface area, the more concentrated the electric field, and the greater the field enhancement factor);
- just like graphite, they are highly chemically stable and resist virtually any chemical impact unless they are simultaneously exposed to high temperatures and oxygen - a property that makes them extremely resistant to corrosion;
- Their hollow interior can be filled with various nanomaterials, separating and shielding them from the surrounding environment - a property that is extremely useful for nanomedicine applications like drug delivery.

All these properties make carbon nanotubes ideal candidates for electronic devices, chemical/electrochemical and biosensors, transistors, electron field emitters, lithium-ion batteries, white light sources, hydrogen storage cells, cathode ray tubes (CRTs), electrostatic discharge (ESD) and electrical-shielding applications.

Q.21) Which of the following fuel production is promoted under the Sustainable Alternative Towards Affordable Transportation (SATAT) initiative?

a) Methanol
b) Hydrogen Compressed Natural Gas
c) Compressed Bio-Gas
d) Biodiesel

Q.21) Solution (c)

- Under the **Sustainable Alternative Towards Affordable Transportation (SATAT) initiative**, the government is looking at setting up 5,000 **compressed bio-gas or CBG plants** by 2023-24 with a production target of 15 million tonnes.

- To boost the availability of affordable and clean transport fuel, an agreement was signed for setting up 900 compressed bio-gas or CBG plants by companies such as Adani Gas and Torrent Gas.
- SATAT provides for generating gas from municipal waste as well as forest and agri waste. Animal husbandry and marine wastes are also included.

Q.22) Which of the following labour code for the first time in Indian law attempted to define 'platform work' outside of the traditional employment category?

a) Code on Wages.
b) Industrial Relations Code.
c) Social Security Code.
d) Occupational Safety, Health and Working Conditions Code.

Q.22) Solution (c)

- The **Code on Social Security, 2020**, for the first time in Indian law, attempted to define 'platform work' outside of the traditional employment category.
- Platform Work (as defined by the Code) means a work arrangement outside of a traditional employer-employee relationship in which organisations or individuals use an online platform to access other organisations or individuals to solve specific problems or to provide specific services or any such other activities which may be notified by the Central Government, in exchange for payment.

Q.23) Consider the following pairs:

Folk Arts	***State***
1. Bhavai	Gujarat
2. Naman - Khele	Rajasthan
3. Therukoothu	Kerala

Which of the pairs given above are correctly matched?

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

d) 1 and 3 only

Q.23) Solution (b)

- India's Films Division (FD) is organising Lok Virasat, a festival of films on folk art and painting.
- The films being streamed include:
    - The Kingdom of God: It is a film on the great Indian heritage of art and culture with focus on various folk art traditions.
    - **Bhavai** - Fading Memories: A film on Bhavai which is a folk art of **Gujarat**.
    - **Naman - Khele**: A film on the ancient folk art performed in Ratnagiri, **Maharashtra**.
    - SahiJata - The Fusion Cult: A film on the unique fusion of muscle and music in the form of folk art on the back-drop of the ancient Orissa town of Puri
    - **Therukoothu** - Dancing For Life: A film depicting the age old **Tamil** folk art.

Q.24) Which of the following countries are members of Asia-Pacific Economic Cooperation (APEC)?

1. Mexico
2. China
3. Indonesia
4. Ecuador
5. India

Select the correct answer using the code given below:

a) 1, 2 and 3 only
b) 2, 4 and 5 only
c) 1, 2, 3 and 4 only
d) 1, 2, 3 and 5 only

Q.24) Solution (a)

- Recently, a virtual meeting of the 21-member **Asia-Pacific Economic Cooperation (APEC)** forum was held. The meeting was hosted by Malaysia.

- Asia-Pacific Economic Cooperation was established in 1989.
- Member Nations: Australia, Brunei, Canada, Chile, **China**, Hong Kong, **Indonesia**, Japan, South Korea, Malaysia, **Mexico**, New Zealand, Papua New Guinea, Peru, Philippines, Russia, Singapore, Chinese Taipei, Thailand, Vietnam and the United States.
- Its 21 member economies are home to around 2.8 billion people and represented approximately 59% of world GDP and 49% of world trade in 2015.
- India is not a Member of APEC.

Q.25) Recently the places Antaragange Betta, Aadi Narayana Swamy Betta and Mahima Ranga Betta are declared as

a) Deemed forest areas
b) Conservation Reserves
c) Wildlife Sanctuaries
d) Biodiversity Heritage sites

Q.25) Solution (d)

- The Karnataka Biodiversity Board has decided to declare four more areas in the State as biodiversity heritage sites.

- A resolution is passed to declare
    - **Antaragange Betta** in Kolar; It has a unique and perennial water source flowing all through the year
    - **Aadi Narayana Swamy Betta** in Chickballapur; had many dry-belt species protected by locals.
    - **Mahima Ranga Betta** in Nelamangala, Bengaluru; it is a prominent lung space surviving in Bengaluru.
    - Urumbi area on the Kumaradhara river basin in Dakshina Kannada as biodiversity heritage sites has has a fragile environmental system and is located on the banks of the river Kumaradhara.
- Biodiversity heritage sites are considered unique and fragile ecosystems that can be marine ecosystems, coastal and inland waters, or terrestrial areas.
- Notifying an area as biodiversity heritage site will help protect the rich and unique ecosystem in a particular area from further destruction.

Q.26) The 'Garima Greh' is a shelter home for which of the following?

a) Women victims of difficult circumstances
b) Manual scavengers
c) Abandoned senior citizens
d) Transgender persons

Q.26) Solution (d)

- **A 'Garima Greh: A Shelter Home for Transgender Persons'** was recently e-inaugurated in Vadodara, Gujarat.
- Under the Scheme of 'Shelter Home for Transgender Persons', the Ministry for Social Justice & Empowerment has decided to set up shelter homes for transgender persons who have been forced to leave their homes or abandoned by the family.
- They will be run by transgender community-led organisations. These shelters will also provide skill training to connect the community members with livelihood opportunities.

Q.27) The MQ9B Sea Guardian unarmed drones which are recently inducted by the Indian Navy are procured from which of the following country?

a) USA

b) Israel
c) Russia
d) France

Q.27) Solution (a)

- Recently, two **American MQ9B Sea Guardian unarmed drones** have been inducted by the Indian Navy.
- MQ9B Sea Guardian is the maritime variant of the Predator MQ9 Unmanned Aerial Vehicle (UAV) and has a maximum endurance of 40 hours and a maximum flying altitude of 40,000 feet.
- It has 3600 maritime surveillance radar and optional multimode maritime surface search radar.

Q.28) With respect to *One Health Global Leaders Group on Antimicrobial Resistance,* which of the following statements is/are *NOT* correct?

1. It is a collaborative effort of the World Health Organization (WHO), World Organisation for Animal Health (OIE) and the Food and Agriculture Organization (FAO).
2. It was created in response to a recommendation from the Interagency Coordination Group on AMR (IACG).

Select the correct answer using the code given below:

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

Q.28) Solution (d)

Statement 1	Statement 2
Correct	**Correct**
The One Health Global Leaders Group on Antimicrobial Resistance was launched by Food and Agriculture Organization, World	**It was created in response to a recommendation from the Interagency Coordination Group on AMR (IACG)** that

Organisation for Animal Health and World Health Organization. This 20-member group comprises heads of states, current and former ministers of different countries, leaders from the private sector and civil society.	submitted its report to the Secretary-General of the United Nations in April 2019. The group will elevate the need to prioritize best practices to address AMR at global, regional, and national levels.

Q.29) The only Cherry Blossoms festival in India is hosted by which of the following Capital city?

a) Kohima
b) Shillong
c) Gangtok
d) Imphal

Q.29) Solution (b)

- India **International Cherry Blossom Festival** is the calendar event of Meghalaya which attracts a large number of tourists annually in **Shillong**. It is the only Cherry Blossoms festival in India.
- It was cancelled in 2020 due to COVID-19 pandemic.

Q.30) With reference to World Wide Radio Navigation System (WWRNS), consider the following statements:

1. Its components are recognised by the International Navigation Association.
2. Recently India has become only third country in the world to have its Indian Regional Navigation Satellite System (IRNSS) recognised as a part of the WWRNS.

Which of the statements given above is/are correct?

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

Q.30) Solution (d)

Statement 1	Statement 2
Incorrect	**Incorrect**
The Indian Regional Navigation Satellite System (IRNSS) has been accepted as a component of the World Wide Radio Navigation System (WWRNS) for operation in the Indian Ocean Region by the Maritime Safety Committee (MSC) of the International Maritime Organization (IMO). This will enable merchant vessels to use IRNSS for obtaining position information similar to GPS and GLONASS to assist in the navigation of ships in ocean waters within the area covered by 50°N latitude, 55°E longitude, 5°S latitude and 110°E longitude.	**India has become the fourth country in the world** to have its independent regional navigation satellite system recognised by the IMO as a part of the WWRNS. The other three countries that have its navigation systems recognised by the IMO are the US, Russia and China.

Q.31) A mango and orange costs Rs 200 and Rs 100 respectively. The price of mango and orange is increased by 20% and 25% respectively. If a person wants to buy 10 mangoes and 5 oranges, then what should be the percentage change in the total amount spent by him after an increase in the price?

a) 20%
b) 21%
c) 18%
d) 15%

Q.31) Solution (b)

Price of mango becomes Rs 200 → Rs 240 (After 20% increase)

Price of Orange becomes Rs 100 → Rs 125 (After 25 % increase)

Before the increase in price his expenditure was

200*10+100*5= 2500

After an increase in the price, the expenditure will be

240*10+125*5=3025

Percentage increase = (3025-2500)×100/2500 = 21%

Q.32) 8% of the people eligible to vote are between 18 and 21. In an election 85% of those eligible to vote who were between 18 and 21 actually voted. In that election, people between 18 and 21 who actually voted were what percent of those people eligible to vote?

4.2%

6.4%

6.8%

8.6%

Q.32) Solution (c)

Let the people eligible to vote be P

Then people eligible to vote between 18 and 21 = 8P/100

In the election people who voted between 18 and 21 = 85/100 * 8P/100

Required percentage = {[85/100 * 8P/100]/P} * 100 = 6.8%

Q.33) In a competitive exam there were 5 different sections. 10% of the total number of students cleared the cut off in all the sections and 5% cleared none of the sections. From the remaining candidates, 30% cleared only section 1, 20% cleared only section 2, 10% cleared only section 3 and the remaining 1,020 candidates cleared only section 4. How many students appeared in the competitive exam?

a) 2,550
b) 3,000
c) 3,200
d) 3,800

Q.33) Solution (b)

Let the total of students are 100. So, 15 cleared either no section or all sections. Out of the remaining 85 students, 60% cleared 1 section or 2 sections or 3 sections.

So, the number of students who cleared 4 sections is 40% of 85 = 34.

Now, if 34 students cleared section 4, total students are 100

If 1,020 students cleared section 4, total students = (100/34)*1,020 = 3,000

Read the following 2 (two) passages and answer the questions that follow each passage. Your answer to these questions should be based on passage only.

Passage 1

Aspiration is nothing new. Neither is the debate over what the Indian middle class is, what it wants and what it buys. Since the mid-80s, that has been the focus of the economic policy papers so-called pro- and anti-poor budgets and marketing strategies that have successfully broken the barrier of urban selling and reached deeper into rural India with increasing income levels and aspirations.

Q.34) Based on the above passage, it can be inferred that

a) the Indian middle class has been the focus of economic policies for a long time
b) the Indian middle class has graduated from being the 'deprived' middle class to the 'pampered' middle class
c) Both a and b
d) Neither a nor b

Q.34) Solution (a)

There is nothing in the passage to suggest that the Indian middle class has been transformed into a 'pampered' middle class. Options b and c are incorrect. However, the paragraph strongly suggests that the Indian middle class has been the focus of the economic policies of the Government for a long time now. So, option a can be inferred.

Passage 2

Developed countries have made adequate provisions for social security for senior citizens. State insurers (as well as private ones) offer Medicare and pension benefits to people who can no longer earn. In India, with the collapse of the joint family system, the traditional shelter of the elderly has disappeared. And a State faced with a financial crunch is not in a position to provide social security. So, the working population should give serious thought to building a financial base for itself.

Q.35) Which one of the following if it were to happen, weakens the conclusion drawn in the

above passage the most?

a) The investable income of the working population, as a proportion of its total income, will grow in the future
b) The insurance sector is underdeveloped and trends indicate that it will be extensively privatized in the future
c) India is on a path of development that will take it to a developed country status, with all its positive and negative implications
d) If the working population builds a stronger financial base, there will be a revival of the joint family system

Q.35) Solution (c)

The main conclusion of the paragraph is that the working population should save for its future given that the Indian state is not in a position to provide social security for its citizens. The underlying assumption is that the Indian state would not be in a position to provide social security even in the future. If option c is true, then this assumption is attacked and the conclusion is weakened.