IASBABA'S

60 DAYS PLAN

PRELIMS 2021

COMPILATIONS

S&T - PART 2

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Q.1) With reference to National Pharmaceutical Pricing Authority, consider the following statements:

1. It is responsible for fixing and revising the prices of pharmaceutical products.
2. It is under Ministry of Health and Family Welfare.
3. Only the prices of drugs that figure in the National List of Essential Medicines (NLEM) are monitored and controlled by the NPPA.

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.1) Solution (c)

Statement analysis

Statement 1: National Pharmaceutical Pricing Authority is responsible **for fixing and revising the prices** of pharmaceutical products as well as the enforcement of the DPCO.

Statement 2: NPPA is an independent body under Department of Pharmaceuticals under the **Union Ministry of Chemicals and Fertilizers.**

Statement 3: Under the provisions of DPCO 2013**, only the prices of drugs that figure in the National List of Essential Medicines (NLEM) are monitored and controlled by the National Pharmaceutical Pricing Authority.**

Q.2) 'One health concept' sometimes seen in news is related to?

a) Streamlining action against communicable and non-communicable diseases.
b) Participation of public and private sector in primary, secondary and tertiary health sector.
c) Maternal health care and child health care strategies.
d) Interconnectivity among human health, animal health and environment.

Q.2) Solution (d)

Explanation:

The concept of 'One Health', which recognises that health of human beings is connected to health of animals and environment, is gaining importance as most of the contagious diseases affecting humans are zoonotic (animal to man origin) in nature.

Of the contagious diseases affecting humans, **more than 65% are of zoonotic or animal to man origin.** 75% of emerging infectious human diseases have an animal origin.

One Health model facilitates interdisciplinary approach in disease control so as to control emerging and existing zoonotic threats. Current outbreak of COVID-19 still could not find out the actual source of virus. Even though genomics of the virus has been published ambiguity still exists whether it was from bats, snakes, pangolin, etc.

Q.3) National Health Profile is published by

a) Central Bureau of Health Intelligence
b) NSSO
c) NITI Aayog
d) National Family Health Survey

Q.3) Solution (a)

Explanation:

An updated and credible National Health Data is essential for effective planning, decision-making, monitoring and evaluation of various Health Programmes & Health Sector Development activities.

To achieve this objective, the Central Bureau of Health Intelligence (CBHI), annually brings out a Publication "National Health Profile (NHP), which covers all the major information on Demography, Socio-Economic Status, Disease Morbidity & Mortality, Healthcare Finance, Human Resources in Health and Healthcare Infrastructure.

NHP is an initiative which is at par with international standards of data publications.

Q.4) Which of the following statements with reference to Cytokine storm syndrome is/are *incorrect*?

1. Cytokines are small proteins released by many different cells in the body to coordinate the body's response against infection and trigger inflammation.

2. Cytokine storm is an immune reaction triggered by the body to fight an infection when it turns severe.
3. Cytokine storm syndrome cannot cause mortality.

Select the appropriate option:

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

Q.4) Solution (d)

Basic information:

The immune systems in our bodies protect us from bacteria, viruses, and parasites by removing them from our systems. The immune system gets activated by things that the body does not recognise as its own. These things are called antigens, and include bacteria, fungi and viruses.

An effective immune system response involves inflammation, an important and indispensable part of the process. The release of inflammatory mediators increases the blood flow to the area, which allows larger numbers of immune system cells to be carried to the injured tissue, thereby aiding the repairing process. However, if this inflammatory response is not regulated, very dangerous consequences can follow. This is when a 'cytokine storm' can be triggered.

Explanation:

Statement 2: Cytokines **are small proteins released by many different cells** in the body to coordinate the body's response against infection and trigger inflammation.

Statement 2: **Cytokine storm —is an immune reaction triggered by the body to fight an infection is known as a cytokine storm when it turns severe**. The body releases too many cytokines, proteins that are involved in immunomodulation, into the blood too quickly. While normally they regulate immune responses, in this case they cause harm and can even cause death. Experts have noticed a violent cytokine storm in several individuals who are critical with COVID infection.

Statement 3: **CSS is seen as a likely major cause of mortality in both the 1918-20 Spanish Flu** that killed more than 50 million people worldwide, and the **H1N1 (swine flu) and H5N1 (bird flu)** outbreaks in recent years.

Q.5) Consider the following pairs and identify the *incorrect* pair:

Report /index* : : *Published by

a) World Health Statistics : : World Economic Forum
b) Healthy states progressive India : : Niti Aayog
c) COVID-19 Crisis Through a Migration Lens : : World Bank
d) All of the above are correct

Q.5) Solution (a)

Explanation:

Pair 1: **WHO's annual World Health Statistics reports** present the most recent health statistics for the WHO Member States. The statistics provided by the WHO will help the government in taking necessary policy measures to improve the health standards in the country.

Pair 2: **"Healthy States, Progressive India" is a comprehensive Health Index report released by the NITI Aayog**. This report is also known as 'Health Index'. The report ranks states and Union territories innovatively on their year-on-year incremental change in health outcomes, as well as, their overall performance with respect to each other.

Pair 3: "COVID-19 Crisis Through a Migration Lens" has been published by World Bank.

Q.6) Consider the following statements:

1. Probiotics are live food supplements used in yoghurt and other fermented milk products.
2. Probiotics increases cholesterol absorption and reduces immunity.

Select the correct code

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

Q.6) Solution (a)

Explanation:

Statement 1: Probiotics are live microorganisms that are intended to have health benefits when consumed or applied to the body**. Probiotics are live food supplements used in yoghurt and other fermented milk products.**

Statement 2: Probiotics may have a variety of effects in the body, and different probiotics may act in different ways, thus they contribute to the following:

- They **increase the immunity** and prevent or make diarrheal diseases milder
- They decrease the risk of colon cancer
- The **decrease cholesterol absorption**.
- They produce acids that decrease the pH in the gut and thus increase the absorption of minerals such as calcium and phosphorus.

Q.7) The term CBNAAT and GeneExpert machine is associated with treatment of

a) Malaria
b) Parkinson diseases
c) Alzheimer diseases
d) Tuberculosis

Q.7) Solution (d)

Explanation:

Cartridge based nucleic acid amplification test (CB-NAAT, GeneXpert,) is an automated cartridge-based molecular technique which not only detects **Mycobacterium Tuberculosis** but also rifampicin resistance within two hours and has been endorsed by WHO as an initial diagnostic test in children suspected of having tuberculosis both in pulmonary and specific forms of extra pulmonary tuberculosis.

Q.8) Consider the following pairs:

	Plant diseases / Insects	:	***Plant affected***
1.	Yellow rust diseases	:	Wheat crop
2.	Sheath blight diseases	:	Rice
3.	Pink Bollwarm	:	Cotton
4.	Panama diseases	:	Banana

Which of the above given pairs are correctly matched?

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

Q.8) Solution (d)

Statement analysis:

Statement 1: Yellow rust is a fungal disease which turns the crop's leaves into a yellowish colour and stops photosynthesis activity, which eventually could result in a drop of **wheat crop** productivity.

Statement 2: Sheath blight is fungal disease that can cause up to 60 per cent reduction in **rice yield.**

Statement 3: **The pink bollworm** (Pectinophora gossypiella) is one of the most destructive pests **of cotton.** Though probably native to India, it is now distributed worldwide. It bores into cotton bolls, devouring blossoms and seeds.

Statement 4: Panama disease (also known as fusarium wilt) is caused by the soil-borne fungus Fusarium oxysporum f. sp. cubense. Panama disease is considered to be the most destructive **disease of banana in modern times.**

Q.9) Consider the following statements with reference to World Health Organization:

1. WHO is an UN Specialised agency and member of United Nation Sustainable Development group.
2. WHO is funded through assessed contribution from the member states according to their economic strength.
3. WHO has power to sanction its member nation if it does not cooperate with it.

Which of the following 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 (a)

Statement Analysis:

Statement 1: The World Health Organization is a **specialized agency of the United Nations** responsible for international public health. It was established in 1948 with its headquarter in Geneva. It is also part of **UN Sustainable Development group**, previously called UN development group.

Statement 2: **WHO is funded through a system of assessed and voluntary contributions. Assessed contributions are paid by all member states, and are calculated on the basis of a country's gross national product and population** while Voluntary contributions are amounts voluntarily paid by other UN organisations, private companies, individuals, NGOs as well as member states

Statement 3: WHO's authority is recommendatory in nature unlike bodies like World Trade Organisation (WTO), **it has no ability to issue binding decision or sanction its members.**

Q.10) Consider the following statements:

1. Generic version of drug has same molecular structure as the brand version.
2. Biosimilar medicine costs less than generic drug.
3. Of the Indian pharmaceutical sector, generic drugs constitute the largest segment with a market share of 70%.

Which of the above given statements are correct?

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

Q.10) Solution (b)

Explanation:

Statement 1:**. The** compounds in the **generic versions of a drug have the same molecular structure as the brand-name version,** their quality is essentially the same. The generic drug has the same "active ingredient" as the brand-name drug. This ingredient is the one that cures the patient.

Statement 2: Biosimilar is a biologic medical product that is almost an identical copy of an original product that is manufactured by a different company. They are officially approved versions of original "innovator" products and can be manufactured when the original product's patent expires (after 20 years).

Generic drugs are chemically identical to the original branded drug and, as such, cost significantly less because they don't require much testing. Because biosimilars are made from living organisms, though, and don't contain identical ingredients to their name-brand counterparts, they still require some testing**. So, they cost more than generics, but less than the branded biologic.**

Statement 3: India is considered as the 'pharmacy of the world' due to its ability to produce a wide range and great volume of medicines, that too at low costs. It is one of the leading producer of generic medicines**. Of the Indian pharmaceutical sector, generic drugs constitute the largest segment with a market share of 70%.**

Q.11) Which of the following statements are not correct with reference to Transfats?

1. Transfats are largely produced artificially but a small amount also occurs naturally.
2. Saturated fats are more harmful than Transfats.
3. Recently union government proposed to make India Trans Fat free by 2022, a year ahead of target set by World Health Organization.

Select the correct code

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

Q.11) Solution (b)

Statement Analysis:

Statement 1	**Statement 2**	**Statement 3**
Correct	**Incorrect**	**Correct**
Trans fatty acids (TFAs) or Trans fats are the most harmful type of fats	**TFAs pose a higher risk of heart disease than saturated fats.**	In May 2018, WHO called for the global elimination of industrially produced

which can have much more adverse effects on our body than any other dietary constituent. **These fats are largely produced artificially but a small amount also occurs naturally**. Thus in our diet, these may be present as Artificial TFAs and/ or Natural TFAs.	While saturated fats raise total cholesterol levels, TFAs not only raise total cholesterol levels but also reduce the good cholesterol (HDL), which helps to protect us against heart disease.	TFA by 2023 and In May 2019, **WHO released REPLACE action framework** which is a roadmap for countries to implement the prompt, complete and sustained elimination of industrially produced TFA from the food supply. **Recently union government proposed to make India Trans Fat free by 2022, a year ahead of target set by World Health Organization**

Q.12) Consider the following statement with reference to FSSAI?

1. The Eat Healthy Campaign which focused on daily intake of salt, sugar, fat, phasing out trans-fats has been initiated under FSSAI.
2. Repurpose Used cooking Oil (RUCO) initiative has been launched by FSSAI in order to help companies convert used cooking oils into biofuels.

Select the Incorrect answer using the code below:

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

Q.12) Solution (d)

Explanation:

Incorrect statement is being asked here

Statement Analysis:

Statement 1	Statement 2
Correct	**Correct**
Eat Healthy Campaign launched by FSSAI focuses on the daily intake of salt, sugar, fat, phasingout trans-fats.	Repurpose Used cooking **Oil (RUCO) was launched by FSSAI in order to help companies convert used cooking oils into biofuels** (it is also supported by National biofuels policy, 2018). Under this around 64 companies at 101 locations have been identified to enable collection of used cooking oil.

Q.13) Consider the following statements:

1. Orphan diseases comprise both rare diseases and neglected diseases.
2. There is no cure for polio, it can only be prevented by immunization.
3. The purpose of MERA India is to eliminate malaria by 2025.

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.13) Solution (a)

Explanation:

Statement 1: Rare diseases are also called "orphan diseases". They are called orphans because the pharmaceutical industry does not find it profitable to develop market products**. Orphan diseases comprise both rare diseases and neglected diseases.** The most common rare diseases include Haemophilia, Thalassemia, Sickle-cell Anaemia and Primary Immune Deficiency in children, auto-immune diseases etc.

Statement 2: Polio (poliomyelitis) is a highly infectious viral disease. The poliovirus invades the nervous system and can cause irreversible paralysis in a matter of hours. Polio is spread through person-to-person contact. When a child is infected with wild poliovirus, the virus enters the

body through the mouth and multiplies in the intestine. **There is no cure for polio, it can only be prevented. Polio vaccine, given multiple times, can protect a child for life.**

Statement 3: Malaria is considered to be one of the highly prevalent infectious diseases and the most common cause of death after tuberculosis. Malaria is caused by protozoan parasites (Plasmodium species) and is transmitted from one human to another by the bite of infected Anopheles mosquitoes. **The purpose of Malaria Elimination Research Alliance (MERA) India** is to identify, articulate, prioritise and respond to the research needs of the country in a coordinated and combinatorial **way to eliminate malaria from India by 2030.**

Q.14) The term Bio-bubble recently in news is associated to?

a) An inovative technique to reduce the impact of Global warming.
b) Technique used by plants to protect themselves from insect.
c) Technique in trial to reduce effect of sun rays.
d) Sanitised area to contain the spread of CoVid -19.

Q.14) Solution (d)

Explanation:

A bio-bubble is a safe and secure environment isolated from the outside world to minimise the risk of COVID-19 infection. It permits only authorised sports persons, support staff and match officials to enter the protected area after testing negative for COVID-19.

The Board of Control for Cricket in India (BCCI) will provide 'bio secure bubbles' in hotels, training sessions, matches and transportation. Naturally, individuals must be regularly tested, temperature checked with respective health reports filed accordingly.

Q.15) Consider the following statements and select the correct statement/s:

a) Pandemic is a sudden increase in the number of cases of a disease—more than what's typically expected for the population in that area.
b) Epidemic is a pandemic that has spread over several countries or continents, affecting a large number of people.
c) Both (a) and (b)
d) None of the above

Q.15) Solution (d)

Explanation:

Statement 1: **Epidemic is a sudden increase in the number of cases of a disease—more than what's typically expected for the population in that area**.

Statement 2: **Pandemic is an Epidemic that has spread over several countries or continents, affecting a large number of people**. The last pandemic declared was in 2009 during the outbreak of H1N1 flu, commonly known as the swine flu. The only current pandemic was HIV/AIDS, which started in the 1980s.

Q.16) Consider the following statements with reference to Global Fund to fight AIDS, Tuberculosis and Malaria:

1. It is a partnership of governments, civil society, technical agencies, the private sector and people affected by the diseases.
2. WHO is trustee of funds contributed to the Global Fund to fight AIDS, Tuberculosis and Malaria.

Which of the above statements is/are correct?

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

Q.16) Solution (c)

Basic information:

The Global Fund is a partnership designed to accelerate the end of AIDS, tuberculosis and malaria as epidemics. As an international organization, the Global Fund mobilizes and invests more than US$4 billion a year to support programs run by local experts in more than 100 countries. In partnership with governments, civil society, and technical agencies, the private sector and people affected by the diseases, we are challenging barriers and embracing innovation.

Statement Analysis

Statement 1: Global Fund was created in 2002 - to end TB, AIDS and Malaria as epidemics. It is a **partnership of governments, civil society, technical agencies, the private sector and people**

affected by the diseases. This multistakeholder international organization maintains its secretariat in Geneva, Switzerland.

Statement 2: The **World Bank is the trustee of funds contributed to the Global Fund.**

Q.17) Consider the following statements:

1. TypBar TCV is the world's first clinically proven conjugate Typhoid vaccine.
2. Schedule H1 Drug are dangerous to take except in accordance with the medical advice.

Which of the statements give above is/are correct?

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

Q.17) Solution (c)

Statement analysis:

Statement 1	Statement 2
Correct	**Correct**
Typbar TCV is the world's first clinically proven conjugate Typhoid vaccine. And is the only approved vaccine for children and infants less than 2 years of age. Typhoid bacteria can be treated with antibiotics but the microbes have developed resistance against multiple antibiotics. Extensively drug-resistant (XDR) typhoid outbreaks have been found in India, Bangladesh, and Pakistan.	**Schedule 1 Drug are not to be sold by retail without the prescription of a Registered Medical Practitioner.** The Drugs falling under Schedule H1 are required to be sold in the country with the following conditions • The supply of a drug specified in Schedule H1 shall be recorded in a separate register at the time of the supply giving the name and address of the prescriber, the name of the patient, the name of the drug and the quantity supplied and such records shall be maintained for three years and be open for inspection. • The drug specified in Schedule H1 shall be

Pakistan is also the first country to introduce the typhoid conjugate vaccine as part of its national immunisation programme.	labelled with the symbol Rx which shall be in red and conspicuously displayed on the left top corner of the label.

Q.18) Consider the following statements:

1. International Health regulation is an agreement between countries to work together for global health security.
2. Coalition for epidemic preparedness innovation is working to accelerate the development of vaccines against emerging infectious diseases.

Which of the above statements is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 and 2

Q.18) Solution (c)

Statement Analysis

Statement 1**: International Health regulation represents an agreement between 196 countries including all WHO Member States to work together for global health security**. It was signed in 2005, Through IHR, countries have agreed to build their capacities to detect, assess and report public health events.

Stattement 2: CEPI is an innovative global partnership between public, private, philanthropic, and civil society organisations. **CEPI is working to accelerate the development of vaccines against emerging infectious diseases**. CEPI's initial priority pathogens include Middle East respiratory syndrome (MERS), Lassa, Nipah, Chikungunya and Rift Valley Fever.

Q.19) Consider the following statements:

1. Phage therapy is the therapeutic use of bacteriophages to treat bacterial infections.
2. Serial interval is the duration between symptom onset of a primary case and symptom onset of secondary cases (contacts) generated by the primary case.

Which of the above statements is/are *incorrect*?

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

Q.19) Solution (d)

Explanation:

Note: incorrect statements are asked.

Statement 1: The practice of phage therapy, **which uses bacterial viruses (phages) to treat bacterial infections,** has been around for almost a century. The universal decline in the effectiveness of antibiotics has generated renewed interest in revisiting this practice. Conventionally, phage therapy relies on the use of naturally-occurring phages to infect and lyse bacteria at the site of infection.

Statement 2:- **Serial interval is the duration between symptom onset of a primary case and symptom onset of secondary cases (contacts) generated by the primary case**. it helps to gauge the effectiveness of infection control interventions besides indicating rising population immunity and forecast future incidence.

Q.20) Which of the following are correct with reference to National Family Health Survey?

1. The MoH&FW has designated IIPS(International Institute for Population Sciences) as the nodal agency for NFHS.
2. According to the latest data of NFHS there has been decrease in stunting and wasting among children in several states.
3. There has been total five National Family Health Survey till now.

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.20) Solution (c)

Statement analysis:

Statement 1**: The Ministry of Health and Family welfare has designated IIPS(International Institute for Population Sciences) as the nodal agency for NFHS**. NFHS is a large-scale, multi-round survey conducted in a representative sample of households throughout India. NFHS is a collaborative project of IIPS, Mumbai and others institutions like.

NFHS was funded by the United States Agency for International Development (USAID) with supplementary support from United Nations Children's Fund (UNICEF).

Statement 2: Accordin to the latest data **there has been an increase in stunting and wasting among children in several states**, a rise in obesity in women and children, and an increase in spousal violence.

Statement 3: This is the fifth NFHS and refers to the 2019-20 period. The first four referred to 1992-93, 1998-99, 2005-06 and 2015-16, respectively.

Q.21) The term "quantum supremacy" is associated with:

a) Astronomical phenomenon
b) A Quantum powered satellite.
c) Quantum Computing
d) None of the above

Q.21) Solution (c)

Basic Information:

- Quantum supremacy is the ability to use a quantum computer to perform a single calculation that no conventional computer, even the biggest supercomputer, can perform in reasonable amount of time.
- Google researchers claim to have achieved a major milestone in computer science known as "quantum supremacy.".
- The Google research involved checking whether the output of an algorithm for generating random numbers was truly random. The researchers were able to use a quantum computer to perform this complex mathematical calculation in three minutes and 20 seconds, according to the paper.
- It is claimed that it would have taken Summit 3—an IBM-built machine that is the world's most powerful commercially-available conventional computer—about 10,000 years to perform the same task.

Q.22) What may happen if a black hole of the same mass as the sun were to take the place of the sun?

a) The Earth and other planets will be destroyed.
b) Earth and the other planets would orbit the black hole as they orbit the sun now.
c) Only the Jovian planets will orbit the black hole and others will collapse into the black hole.
d) None of the above.

Q.22) Solution (b)

Basic Information:

A black hole is a place in space where gravity pulls so much that even light cannot get out. The gravity is so strong because matter has been squeezed into a tiny space. This can happen when a star is dying.

Could a Black Hole Destroy Earth?

- Even if a black hole the same mass as the sun were to take the place of the sun, Earth still would not fall in. The black hole would have the same gravity as the sun.
- Earth and the other planets would orbit the black hole as they orbit the sun now.
- The sun will never turn into a black hole. The sun is not a big enough star to make a black hole.

Q.23) Which of the following physical quantities is/are part of vector quantities?

1. Impulse
2. Power
3. Change in temperature
4. Gravitational Potential

Choose appropriate answer:

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

Q.23) Solution (a)

Scalar is the measurement of a medium strictly in magnitude.

Vector is a measurement that refers to both the magnitude of the medium as well as the direction of the movement the medium has taken.

Impulse is a term that quantifies the overall effect of force acting over time. Since force is a vector quantity, **impulse is also a vector** in the same direction.

Temperature is a scalar quantity. But **change in anything is a vector quantity** because it can go in any direction. The measurement of the increase or decrease in the medium's temperature is a vector quantity.

Gravitational Potential and Power can be fully described by the magnitude or a numerical value alone.

Q.24) Consider the following statements:

1. A hydrogen filled balloon works on the principle of Archimedes principle.
2. A hydrogen filled balloon rises only if its total weight is equal to the weight of air it displaces.

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.24) Solution (a)

A hydrogen filled balloon works on the principle of Archimedes principle. It will rise as long as the total weight of air displaced by balloon is more than the total weight of balloon.

Q.25) A person feels weightless during –

1. He is orbiting in a satellite
2. He is in a free falling lift
3. He is in an aeroplane flying at a high altitude

4. He is having ride in a gas filled balloon

Choose appropriate answer:

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

Q.25) Solution (b)

A person feels weightless during a free fall and in space.

Note: Initially astronauts were trained for weightlessness in free falling lifts.

Q.26) Consider the following statements:

1. Even though the earth and the moon are about the same distance from the sun, yet on the average the earth is much warmer than the moon because the nights on the moon are much longer.
2. Stars appear to move from East to West because the universe is moving from East to West.

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.26) Solution (d)

Statement 1	**Statement 2**
Incorrect	**Incorrect**
The earth and the moon are about the same distance from the sun, yet on the average the earth is much warmer than the moon. Main reason – Since there is no atmosphere on Moon, there is no green house effect to	Since earth rotates from west to east, relatively stars appear to move from east to west.

trap the heat.	

Q.27) Compared to the velocity of light, the velocity of radiowaves is:

a) Smaller
b) Greater
c) The same
d) Depends on the type of radio waves

Q.27) Solution (c)

Both the light waves and radio waves are electromagnetic radiations and move with same velocity.

Q.28) Polarized sunglasses are used to cut glare from sunlight reflected at a glancing angle off cars, water, and other surfaces. Such sunglasses are a practical application of which of the following physical principles?

a) Brewster's law
b) Lenz's law
c) Coulomb's law
d) Snell's law

Q.28) Solution (a)

Explanation:

According to Brewster's law, reflected light will always be polarized in a horizontal direction, parallel to the reflecting surface. Polarized sunglasses are constructed to block this reflected light and to transmit light polarized only in the vertical direction.

Q.29) Light waves are composed of both electric and magnetic field. This theory is proposed by

a) Newton's corpuscular theory
b) Huygen's wave theory
c) Maxwell's theory of light
d) Plank's theory of light

Q.29) Solution (c)

Explanation:

- Maxwell's most significant scientific achievement was his electromagnetic theory of light propagation which he first presented in 1864 with the publication of 'A Dynamical Theory of the Electromagnetic Field'. This paper hypothesised that an electric field, a magnetic field and light could all be explained with the using a single theory.
- Maxwell understood the significance of Faraday's work and realised that the speed of an electromagnetic waves travelled at the speed of light. As a result, he was able to incorporate light, magnetism and electricity into a single theory.
- Maxwell further concluded that light propagated in electric and magnetic waves, which he believed would vibrate perpendicular to one another.

Maxwell's electromagnetic theory of light propagation eventually paved the way for a number of major technological innovations.
The first and possibly most significant of these occurred in 1888, when Heinrich Hertz used Maxwell's theory to create instruments capable of sending and receiving radio pulses.

This discovery, contributed to the creation of the television and the microwave and without Maxwell's tireless efforts, many of the modern conveniences upon which society has come to depend would not exist.

Q.30) When would a human body be most likely to respire anaerobically?

a) When watching TV
b) When running a marathon
c) When asleep
d) When eating

Q.30) Solution (b)

Explanation: Running a marathon will cause the body to demand more oxygen than the lungs can provide.

Q.31) What is a Circumbinary planet?

a) It is a planet that orbits one star instead of two
b) It is a planet that orbits two stars instead of one

c) It is a planet that orbits three stars instead of two
d) It is a planet that orbits two starts instead of three

Q.31) Solution (b)

A circumbinary planet is a planet that orbits two stars instead of one. Because of the short orbits of some binary stars, the only way for planets to form is by forming outside the orbit of the two stars.

Normally planets revolve around a star, the one like our solar system where all planets revolve round Sun (The only star).

Circumbinary planets are those planets whose orbit encompasses two stars. That is why they are called as circumbinary planets.

Kepler-34(AB) b is a circumbinary planet.

On 15 September 2011, astronomers announced the first partial-eclipse-based discovery of a circumbinary planet. The planet, called Kepler-16b, is about 200 light years from Earth, in the constellation Cygnus, and is believed to be a frozen world of rock and gas, about the mass of Saturn. It orbits two stars that are also circling each other, one about two-thirds the size of our sun, the other about a fifth the size of our sun. Each orbit of the stars by the planet takes 229 days, while the planet orbits the system's center of mass every 225 days; the stars eclipse each other every three weeks or so. Scientists made the finding through NASA's Kepler spacecraft, which launched in 2009 and has been a driving force in the recent explosion in the discovery of distant planets.

A new planet, called Kepler-1647b, was announced on June 13, 2016. It was discovered using the Kepler telescope. The planet is a gas giant, similar in size to Jupiter, which makes it the largest circumbinary planet ever discovered. It is located in the stars' habitable zone, and it orbits the star system in 1107 days, which makes it the longest period of any confirmed transiting exoplanet so far.

Q.32) Cryogenics finds application in

a) Surgery, Space technology and Magnetic levitation
b) Telemetry, Space technology and Magnetic levitation
c) Space technology, Surgery and Telemetry
d) Surgery, Telemetry and Magnetic levitation

Q.32) Solution (a)

Telemetry is an automated communications process by which measurements and other data are collected at remote or inaccessible points and transmitted to receiving equipment for monitoring.

Applications of cryogenics

- Aerospace-cryogenic engines
- Medical Field
- Manufacturing field
- Electronics Field
- Fuels research

Q.33) When it is said that the element has 'ductility', what does it mean?

a) It can be beaten into thin sheets
b) It can be drawn into wires
c) It makes a sonorous sound when it is hit
d) It can be moulded into any shape after heating

Q.33) Solution (b)

Ductility is the property of a metal to be drawn into wires under tensile stress i.e. when it is stretched from the edges.

Malleability is the property of metals which allows it to be beaten into thin sheets rather than crumbling.

These two properties are essential for human use as because of these we are able to shape them into desired structures.

Q.34) Friction is a force that exists between the two surfaces. Which of the following statements are correct about friction?

a) It always acts opposite to the direction of motion of the body.
b) It always acts in the direction of motion of the body.
c) It always acts perpendicular to the motion of the body.
d) None of the above

Q.34) Solution (a)

Friction is a force which resists the relative motion between the two surfaces. Higher the roughness, higher is the friction.

Friction always acts parallel to the net force and the direction opposite to it. i.e. in order to retard the motion, the force acts opposite to it.

Q.35) Consider the following statements:

1. Human ear can hear the sound only between 20 Hz and 2000 Hz.
2. Ultrasounds are the medical equipments which use sound of less than 20 Hz.

Which of the above statements is/are correct?

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

Q.35) Solution (d)

For a human ear, the range of audible frequencies is roughly 20 Hz and 20000 Hz. The sounds less than 20 Hz and over 20,000 Hz are inaudible.

Some animals can hear sounds of frequencies higher than 20,000 Hz. Dogs have this ability. The police use high frequency whistles which dogs can hear but humans cannot.

The ultrasound equipment, familiar to us for investigating and tracking many medical problems, works at frequencies higher than 20,000 Hz.

Q.36) Because of their portability, size and user friendly nature, induction stoves have become very famous. Consider the following statements regarding induction stoves:

1. They contain an electric coil which gets heated because of resistance and it heats the vessel.
2. A cooking vessel must be made of ferromagnetic material like cast iron or stainless steel to be directly used over the stove.

Which of the above statements is/are incorrect?

a) 1 only

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

Q.36) Solution (a)

Induction cooking heats a cooking vessel by magnetic induction, instead of by thermal conduction from a flame, or an electrical heating element. Because inductive heating directly heats the vessel, very rapid increases in temperature can be achieved.

In an induction cooker, a coil of copper wire is placed under the cooking pot and an alternating electric current is passed through it. The resulting oscillating magnetic field induces a magnetic flux which repeatedly magnetises the pot, treating it like the lossy magnetic core of a transformer. This produces large eddy currents in the pot, which because of the resistance of the pot, heats it.

For nearly all models of induction cooktops, a cooking vessel must be made of, or contain, a ferromagnetic metal such as cast iron or some stainless steels. However, copper, glass, non magnetic stainless steels, and aluminum vessels can be used if placed on a ferromagnetic disk which functions as a conventional hotplate.

Induction cooking is quite efficient, which means it puts less waste heat into the kitchen, can be quickly turned off, and has safety advantages compared to gas hobs (cooktops). Hobs are also usually easy to clean, because the hob itself does not get very hot.

Q.37) The process of transfer of electric charge from a charged object to earth by means of conductor is called Earthing. Almost all plugs in electrical appliances have an earthing wire which is connected to the top pin of a 3 pin plug. You must have observed that the top pin is the longest and the thickest. Why is the earthing pin longest and thickest?

1. To provide a proper balance to the plug.
2. The longest top pin acts as a hinge in the socket and prevents the plug to fall.
3. So that earth pin touches the circuit first and prevent electric shock.
4. It is thickest so that it conductivity is highest than the other live pins.

Select the code from below:

a) 1 and 2
b) 3 and 4
c) 1, 3 and 4
d) All of the above

Q.37) Solution (b)

The conductivity of a metal depends upon its total area. When we insert the plug, the ground wire should touch first, so that any risk of electric shock is removed. Also the top pin should have more conductivity than the other two pins so that given a chance current should flow from that part rather than the other. Hence the top pin is always longer and thicker than the other two pins.

Q.38) The process of Total Internal Reflection is involved in which of the following phenomenon?

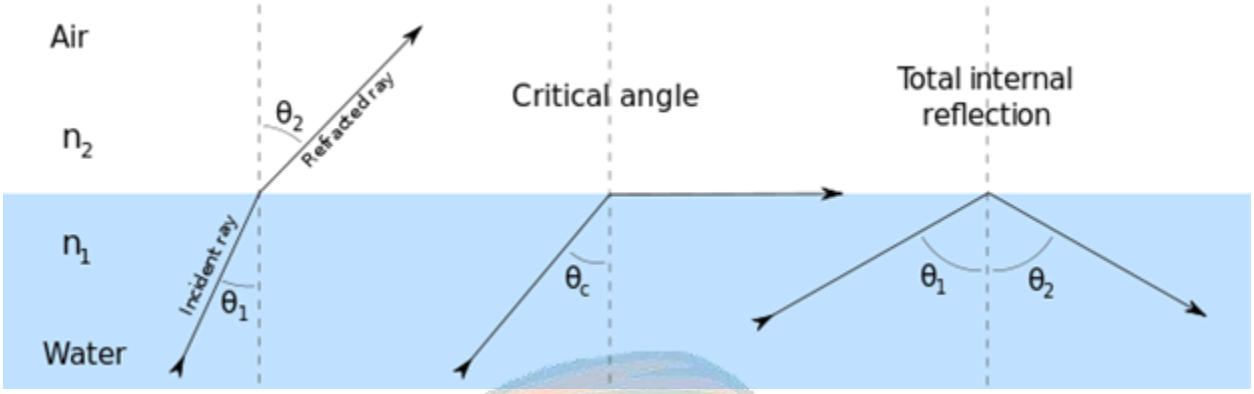
1. Mirage
2. Looming
3. Shine of a Diamond
4. Rainbow

Select the code from below:

a) 1 and 2
b) 1, 2 and 3
c) 3 and 4
d) All of the above

Q.38) Solution (d)

Total internal reflection is the phenomenon which occurs when a propagated wave strikes a medium boundary at an angle larger than a particular critical angle with respect to the normal to the surface. If the refractive index is lower on the other side of the boundary and the incident angle is greater than the critical angle, the wave cannot pass through and is entirely reflected. The critical angle is the angle of incidence above which the total internal reflection occurs. This is particularly common as an optical phenomenon, where light waves are involved, but it occurs with many types of waves, such as electromagnetic waves in general or sound waves.



Mirage: A mirage is a naturally occurring optical phenomenon in which light rays are bent to produce a displaced image of distant objects or the sky. Usually because of total internal reflection, there is a false appearance of water on the ground. In older times, people thought it was a lake kept searching for it.

Looming: Looming is a phenomenon seen in colder areas where there is temperature inversion. It is an abnormally large refraction of the object that increases the apparent elevation of the distant objects and sometimes allows an observer to see objects that are located below the horizon under normal conditions.

Shine of a diamond: The light gets trapped inside the diamond because of its high refractive index. Once the light enters the diamond, there are multiple total internal reflections which traps the light inside it. Hence it shines in the dark.

Rainbow: The phenomenon of refraction, diffraction and total internal reflection are involved in the formation of a rainbow.

Q.39) Which of the following components of a nuclear reactor are correctly matched with their use?

Component : : Use

1. Moderator : : Slows down the speed of neutron
2. Control rod : : Controls the temperature of the reactor
3. Sheild : : Protects the people surrounding the reactor from radioactivity

Select the code from below:

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

d) 2 and 3

Q.39) Solution (c)

Different components of a nuclear reactor are – fuel, control rod, reactor core, shield, moderator and coolant.

Moderator: it slows down the speed of neutron so that they can cause fission. Usually water or Heavy water are used as moderators.

Control Rod: is used to absorb the extra neutron. It is also used as a safety measure. In case of emergency, it is used to absorb all the neutrons to suddenly stop the reaction. Usually Boron or Cadmium rods are used.

Shield: is the outer thick covering of the reactor which protects the people surrounding the reactor from harmful radioactive radiations.

Q.40) Which of the following devices uses thousands of mirrors to focus solar energy at one point (usually focus) to generate heat?

a) Solar cells
b) Solar cookers
c) Solar furnace
d) Solar heaters

Q.40) Solution (c)

A solar furnace is a structure that uses concentrated solar power to produce high temperatures, usually for industry. Parabolic mirrors or heliostats concentrate light (Insolation) onto a focal point. The temperature at the focal point may reach 3,500 °C (6,330 °F), and this heat can be used to generate electricity, melt steel, make hydrogen fuel or nanomaterials.

The largest solar furnace is at Odeillo in the Pyrénées-Orientales in France, opened in 1970. It employs an array of plane mirrors to gather sunlight, reflecting it onto a larger curved mirror.

Fig: The largest Furnace at Odeillo France

Q.41) Yellow Cake, an item of smuggling across border is

a) Uranium oxide
b) A crude form of heroin
c) A crude form of cocaine
d) Unrefined gold

Q.41) Solution (a)

Yellow cake is mined uranium oxide. It is used in Uranium enrichment to be further used in nuclear reactors.

Q.42) Barium in a suitable form is administered to patients before an X-ray examination of the stomach, because

a) barium allows X-rays to pass through the stomach on account of its transparency to X-rays
b) barium compound, like magnesium sulphate helps in cleaning the stomach before X-ray examination
c) barium is a good absorber of X-rays and this helps the stomach to appear clearly in contrast with the other regions in the picture
d) barium salts are white in colour and this helps the stomach to appear clearly in contrast with other regions in the pictures

Q.42) Solution (c)

Barium sulfate is a metallic compound that shows up on X-rays and is used to help see abnormalities in the esophagus and stomach. When taking the test, you drink a preparation containing this solution. The X-rays track its path through your digestive system.

Q.43) Which of the following are the correct differences between fertilizers and Manures?

1. A fertilizer is an inorganic substance which is rich in one element while manure is a natural substance obtained by decomposition of organic material.
2. Fertilizers are prepared in factories while manures can be prepared in the fields.
3. Manure provides humus to the soil while fertilizer does not.

Select the code from below:

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

Q.43) Solution (d)

Fertilizers	Manure
A fertiliser is an inorganic salt.	Manure is a natural substance obtained by the decomposition of cattle dung,human waste and plant residues.
A fertilizer is prepared in factories	A manure can be prepared in the fields
It does not provide any humus to the soil	Manure makes the soil rich in humus.

Fertilizers are very rich in plant nutrients like nitrogen, potassium and phosphorus.	Manure is relatively less rich in plant nutrients.

Q.44) Which of the following statements correctly explains the process of Pasteurisation?

a) Covering a substance with dry salt to prevent the formation of bacteria.
b) Use of Sodium Benzoate and Sodium bisulphate to preserve eatables.
c) Boiling a substance and suddenly cooling it down to kill the bacteria.
d) None of the above

Q.44) Solution (c)

Pasteurization is a process that kills microbes (mainly bacteria) in food and drink, such as milk, juice, canned food, and others.

It was invented by French scientist Louis Pasteur during the nineteenth century. In 1864 Pasteur discovered that heating beer and wine was enough to kill most of the bacteria that caused spoilage, preventing these beverages from turning sour. The process achieves this by eliminating pathogenic microbes and lowering microbial numbers to prolong the quality of the beverage. Today, pasteurisation is used widely in the dairy industry and other food processing industries to achieve food preservation and food safety.

The process involves heating a beverage to a sufficiently high temperature and then suddenly cooling it to kill the bacteria. It increases the shelf life of the beverage without changing its taste and chemistry.

Q.45) Plastics are very versatile material and can be used for various purposes. Consider the following statements regarding plastics:

1. Plastics that can be easily deformed by heating are called Thermoplastics.
2. Bakelite and melamine are the examples of thermoplastics.
3. Bakelite is a poor conductor of electricity and is used for making electric switches.

Which of the above statements are correct?

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

Q.45) Solution (c)

Some plastic articles can bend easily while some break when forced to bend. When we add hot water to a plastic bottle, it gets deformed. Such plastic which gets deformed easily on heating andcan be bent easily are known as thermoplastics. Polythene and PVC are some of the examples of thermoplastics. These are used for manufacturing toys, combs and various types of containers.

On the other hand, there are some plastics which when moulded once, cannot be softened by heating. These are called thermosetting plastics. Two examples are bakelite and melamine. Bakelite is a poor conductor of heat and electricity. It is used for making electrical switches, handles of various utensils, etc. Melamine is a versatile material. It resists fire and can tolerate heat better than other plastics. It is used for making floor tiles, kitchenware and fabrics which resist fire.

Q.46) Which of the following type of energy is stored as Latent Heat?

a) Chemical energy
b) Electrical energy
c) Mechanical energy
d) Thermal energy

Q.46) Solution (d)

Easy direct question.

The latent heat is normally expressed as the amount of heat (in units of joules or calories) per mole or unit mass of the substance undergoing a change of state. In easy terms, the heat required to convert a solid into a liquid or vapour, or a liquid into a vapour, without change of temperature.

Q.47) The one thing that is common to all fossil fuels is that they:

a) Were originally formed in marine environment
b) Contain carbon
c) Have undergone the same set of geological processes during their formation
d) Represent the remains of one living organisms

Q.47) Solution (b)

Direct easy question.

All the fossil fuels are organic fuels containing carbon or hydrocarbons. These burn in the presence of air to generate heat and release carbon dioxide and water vapour.

Fossil fuels can have marine or continental origin. Usually coal has continental origin while Petroleum has marine origin. Also they are derived from different source living organisms and have gone through different set of geological processes during their formation.

Q.48) Which of the following elements have a sedimentary cycle for nutrient recycling?

1. Phosphorous
2. Sulphur
3. Nitrogen

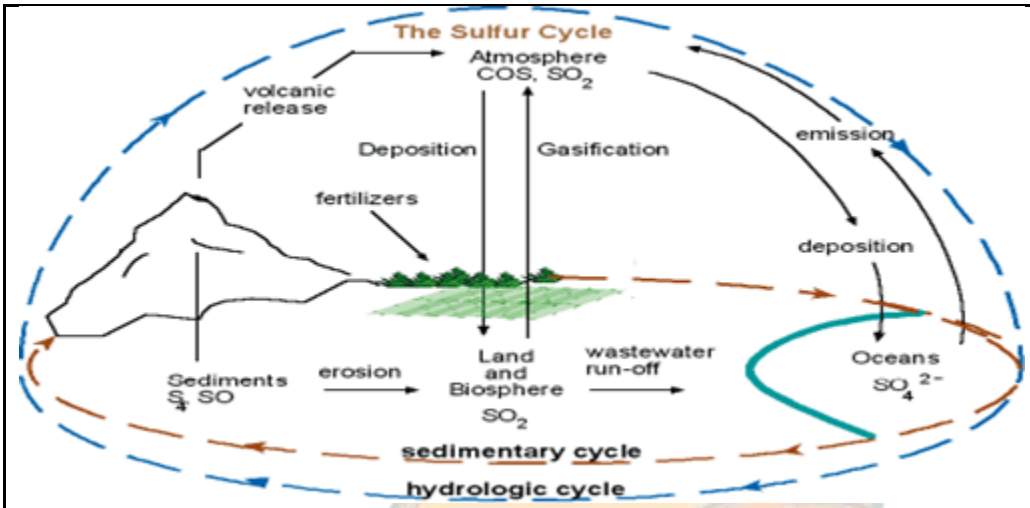
Choose the correct answer using the codes given below

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

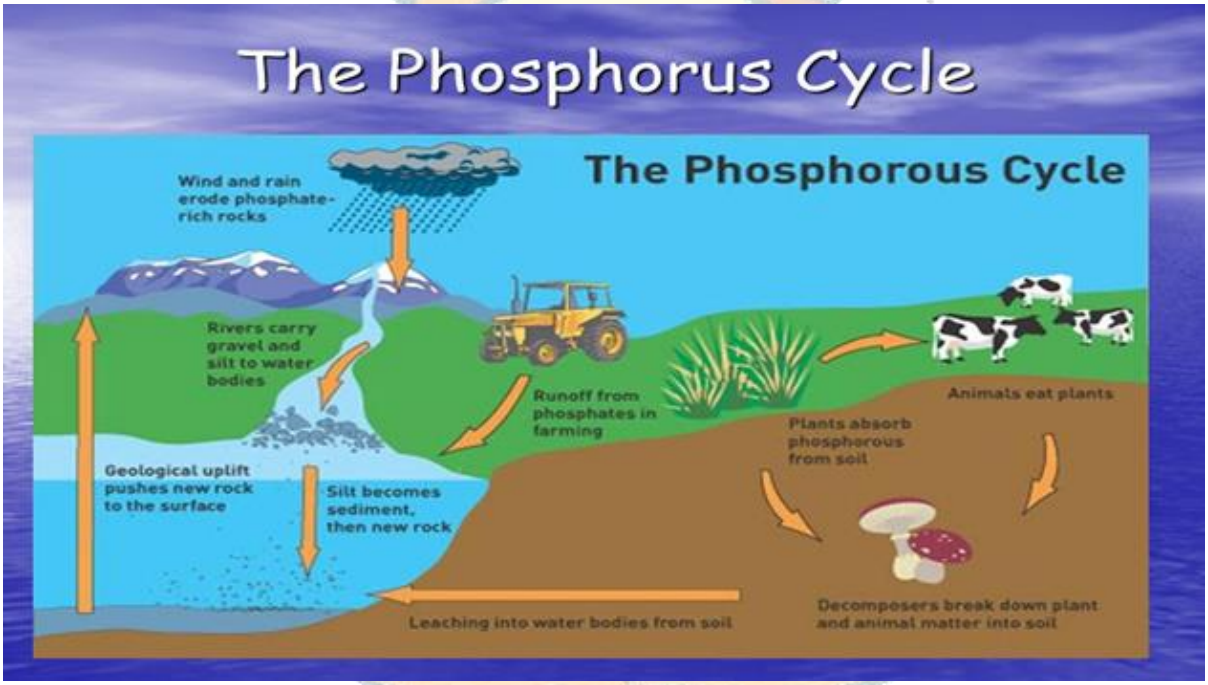
Q.48) Solution (a)

Basic Information:

Sulphur cycle



Phosphorus cycle



Q.49) Recently, the Department of Science and Technology (DST) has approved the use of antiviral nano-coatings on anti-Covid-19 masks. Which 'elements' are expected to boost the protection provided by these masks?

a) Silver and Zinc

b) Silver and Gold
c) Calcium and Zinc
d) Magnesium and Lead

Q.49) Solution (a)

Basic Information:

- Recently, the Department of Science and Technology (DST) has approved the use of antiviral nano-coatings on anti-Covid-19 masks.
- These coatings have been approved for Triple Layer Medical masks and N-95 respirator, as a part of the Mission on Nano Science and Technology (MNST or commonly known as Nano Mission).
- The **antiviral nano-coating** has been developed using **N9 blue silver** which will be modified to form **nanocomplexes with Zinc** (Zn, atomic number-30) compounds to achieve a synergistic effect. Subsequently, it will be applied as coatings on facemasks and other Personal Protection Equipment (PPEs).
- N9 blue nanosilver is a highly potent antimicrobial agent and has been developed at SMITA Research Lab, Indian Institute of Technology (IIT) Delhi.
- Silver (Ag, atomic number-47) is known to have strong antimicrobial activity against bacteria, viruses and fungus

Q.50) Which of the following statements about Graphite are correct?

1. It is an organic compound.
2. It is a good conductor of electricity unlike other allotropes of carbon.
3. It is used as a lubricating agent because of its layered structure.

Select the code from below:

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

Q.50) Solution (d)

Basic Information:

- Graphite and diamond are the two mineral forms of carbon. Diamond forms in the mantle under extreme heat and pressure. Most graphite found near Earth's surface was formed within the crust at lower temperatures and pressures. Graphite and diamond share the same composition but have very different structures.
- The carbon atoms in graphite are linked in a hexagonal network which forms sheets that are one atom thick. These sheets are poorly connected and easily cleave or slide over one another if subjected to a small amount of force. This gives graphite its very low hardness, its perfect cleavage, and its slippery feel.
- In contrast, the carbon atoms in diamond are linked into a frameworks structure. Every carbon atom is linked into a three-dimensional network with four other carbon atoms with strong covalent bonds. This arrangement holds the atoms firmly in place and makes diamond an exceptionally hard material.

Q.51) Which of the following statements about 'Carbon nanotubes' (CNT) is incorrect?

a) They are isotopes of Carbon.
b) They can be synthesised in labs.
c) They exhibit extraordinary strength and unique electrical properties.
d) They are efficient conductors of heat.

Q.51) Solution (a)

Note: Question asks for incorrect statement/s.

Basic Information:

- Carbon nanotubes (CNTs) are an allotrope (**not isotope**) of carbon.
- They take the form of cylindrical carbon molecules and have novel properties that make them potentially useful in a wide variety of applications in nanotechnology, electronics, optics and other fields of materials science.
- They exhibit extraordinary strength and unique electrical properties, and are efficient conductors of heat.
- Inorganic nanotubes have also been synthesized.

Q.52) Which of the following is *not* an advantage of nano-pharmaceuticals over the conventional pharma products?

a) Immediate recovery from ailment
b) Reduction in cost of drug delivery
c) Accurate detection of diseases
d) Reduced collateral damage to the body

Q.52) Solution (a)

Note: question asks for incorrect statement/s.

Basic Information:

Immediate recovery from the disease is a non-reality as body needs some time to build itself back.

Benefits of nano-pharmaceuticals include:

- It overcomes the limitations of the conventional drug delivery systems and precision targeting via nanopharmaceuticals **reduces toxic systemic side effects**, resulting in **better patient compliance**.
- They offer the **ability to detect diseases** at much earlier stages and the diagnostic applications could build upon conventional procedures using nanoparticles.
- Nano pharmaceutical **reduces the cost of drug discovery**, design & development and **enhances the drug delivery process**.

Q.53) Which of the following statements about the Deoxyribonucleic acid is correct?

a) It is stable under alkaline conditions.
b) It contains the ribose sugar.
c) It contains adenine, uracil, cytosine, and guanine bases.
d) It is found mainly in nucleus and cytoplasm.

Q.53) Solution (a)

Basic Information:

DNA and RNA
• DNA stands for deoxyribonucleic acid, while RNA is ribonucleic acid. Although DNA and RNA both carry genetic information, there are quite a few differences between them. • **DNA contains the sugar deoxyribose**, while RNA contains the sugar ribose. The only difference between ribose and deoxyribose is that ribose has one more -OH group than deoxyribose, which has -H attached to the second (2') carbon in the ring. • DNA is a double-stranded molecule while RNA is a single stranded molecule. • **DNA is stable under alkaline conditions** while RNA is not stable. • DNA and RNA perform different functions in humans. DNA is responsible for storing and transferring genetic information while RNA directly codes for amino acids and as acts as a messenger between DNA and ribosomes to make proteins. • DNA and RNA base pairing is slightly different since **DNA uses the bases adenine, thymine, cytosine, and guanine;** RNA uses adenine, uracil, cytosine, and guanine. Uracil differs from thymine in that it lacks a methyl group on its ring. • **DNA is found mainly in nucleus**, whereas RNA is found in both nucleus and cytoplasm. • It is assumed that RNA came into existence before DNA.

Q.54) Which of the following can be considered as a chemical change?

1. Melting of ice
2. Soaring of milk
3. Crystallization of sodium chloride

Choose the correct option

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

Q.54) Solution (c)

Explanation:

Both melting of ice and crystallization of sodium chloride is an example of physical change whereas the Soaring of milk represents a chemical change.

Q.55) Which of the following methods is suitable for preventing an iron frying pan from rusting?

a) Applying grease
b) Applying paint
c) Applying a coating of zinc
d) None of these

Q.55) Solution (c)

Explanation

Zinc has slow corrosion rate that is why it is used frequently as rust-preventive coating. This process is called as Galvanization.

Q.56) Consider the following statements with reference to Surfactants

1. A surfactant is a substance that reduces the surface tension of a liquid in which it is dissolved.
2. Surfactants are used in soaps and detergents.
3. They are known to cause soil pollution.

Which of the above statements is/are correct?

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

Q.56) Solution (d)

A surfactant is a substance that reduces the surface tension of a liquid in which it is dissolved.

When dissolved in water a surfactant gives a product the ability to remove dirt from surfaces such as the human skin, textiles, and other solids. Surfactants are routinely deposited in numerous ways on land and into water systems, whether as part of an intended process or as

industrial and household waste. Some of them are known to be toxic to animals, ecosystems, and humans, and can increase the diffusion of other environmental contaminants.

The two major surfactants used in the year 2000 were linear alkylbenzene sulfonates (LAS) and the alkyl phenol ethoxylates (APE). They break down in the aerobic conditions found in sewage treatment plants and in soil to the metabolite nonylphenol, which is thought to be an endocrine disruptor.

Q.57) Consider the following statements with respect to Chlorination of water.

1. Chlorine can be used as chlorine gas, sodium hypochlorite, and calcium hypochlorite.
2. It kills cells by first damaging the cell membrane, entering the cell, and disrupting cell respiration and DNA activity

Which of the above statements is/are correct?

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

Q.57) Solution (c)

Chlorine can be used as chlorine gas, sodium hypochlorite, and calcium hypochlorite. All of these produce nascent chlorine which is harmful if inhaled directly.

Chlorine inactivates a microorganism by damaging its cell membrane. Once the cell membrane is weakened, the chlorine can enter the cell and disrupt cell respiration and DNA activity (two processes that are necessary for cell survival).

Q.58) The Function of a Catalyst in Chemical reaction is to

a) Stop the reaction.
b) Initiate the reaction.
c) Decrease the speed of reaction.
d) Increase the speed of reaction.

Q.58) Solution (d)

Catalyst is a substance that increases the rate of chemical reaction without undergoing any chemical change itself.

Q.59) Consider the following statements about the Hydrogen atom (Protium).

a) It has 1 proton and 1 one electron.
b) It has 1 neutron and 1 electron.
c) It has 1 proton, 1 neutron and 1 electron.
d) It has 1 proton, 2 neutrons and 1 electron.

Q.59) Solution (a)

Protium atom of Hydrogen 1H1 that is the most common type has 1 proton and 1 electrons. It does not have any neutron.

Neutron is present is deuterium used in Heavy water.

Q.60) Consider the following statements regarding the Litmus Used in Litmus Test.

1. Litmus is extracted from group of fungus.
2. Chlorine gas turns blue litmus paper white.

Which of the above statements is/are correct?

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

Q.60) Solution (c)

Litmus is a water-soluble mixture of different dyes extracted from lichens. It is often absorbed onto filter paper to produce one of the oldest forms of pH indicator, used to test materials for acidity.

The main use of litmus is to test whether a solution is acidic or basic. Wet litmus paper can also be used to test for water-soluble gases that affect acidity or alkalinity; the gas dissolves in the water and the resulting solution colors the litmus paper. For instance, ammonia gas, which is alkaline, colors the red litmus paper blue.

Chemical reactions other than acid-base can also cause a color change to litmus paper. For instance, chlorine gas turns blue litmus paper white – the litmus dye is bleached, because of presence of hypochlorite ions. This reaction is irreversible, so the litmus is not acting as an indicator in this situation.

Q.61) With reference to Plant and Animal cells, consider the following statements:

1. Animal cells do not have a cell wall or chloroplasts but plant cells do.
2. Plant and animal cells are both eukaryotic cells.
3. Animal and plant cells both are mostly round and irregular in shape.

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.61) Solution (a)

Basic Information:

Even though all living organisms are made of cells that contain similar structures, there are differences between the structures of the cells of plants and animals.

- **Plant and animal cells are both eukaryotic cells,** so they have several features in common, such as the presence of a cell membrane, and cell organelles, like the nucleus, mitochondria and endoplasmic reticulum.
- Structures that are specific to plants are the cell wall and chloroplasts.

Major structural differences between a plant and an animal cell include:

- **Animal cells are mostly round and irregular in shape while plant cells have fixed, rectangular shapes.**
- Plant cells have a cell wall, but animals' cells do not. Cell walls provide support and give shape to plants.
- **Plant cells have chloroplasts, but animal cells do not.** Chloroplasts enable plants to perform photosynthesis to make food.
- Plant cells usually have one or more large vacuole(s), while animal cells have smaller vacuoles, if any are present. Large vacuoles help provide shape and allow the plant to

store water and food for future use. The storage function plays a lesser role in animal cells, therefore the vacuoles are smaller.

Q.62) Consider the following statements and select the correct statements from the code given below:

1. Platelets are found only in the blood of mammals.
2. Plasma is the main component of blood and consists of mainly water.
3. RBCs contain mitochondria when they are mature.
4. WBCs are the defense mechanism of the human body for fighting infections.

Choose the appropriate code:

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

Q.62) Solution (d)

Explanation:

Statement 1: Platelets are tiny blood cells that help your body form clots to stop bleeding. If one of your blood vessels gets damaged, it sends out signals to the platelets. The platelets then rush to the site of damage and form a plug (clot) to fix the damage. The process of spreading across the surface of a damaged blood vessel to stop bleeding is called adhesion. This is because when platelets get to the site of the injury, they grow sticky tentacles that help them stick (adhere) to one another. They also send out chemical signals to attract more platelets. The additional platelets pile onto the clot in a process called aggregation. **Platelets are found only in the blood of mammals.** They usually lack nuclei and are formed from bone marrow.

Statement 2: Plasma is a pale yellow mixture of water, proteins and salts. One of the functions of plasma is to act as a carrier for blood cells, nutrients, enzymes, and hormones. This is the liquid portion of the blood. **Plasma is 90 percent water and makes up more than half of total blood volume.** Other 10 percent is protein molecules, including enzymes, clotting agents, immune system components, plus other body essentials such as vitamins and hormones..

Statement 3: **Red blood cells in mammals are unique amongst vertebrates as they do not have nuclei when mature.** They do have nuclei during early phases of erythropoiesis, but extrude them during development as they mature; this provides more space for haemoglobin.

Statement 4: The WBCs, also called leukocytes, handle more complex functions. **They are the defense mechanism of the human body for fighting infections**. There are different types of WBCs with varied life cycles and distinct functions. White blood cells also produce a special protein called antibody which recognize and fight the presence of foreign elements in the body.

Q.63) Which of the following statements correctly defines innate immunity?

a) Inborn immune mechanisms that do not depend upon previous exposure to an antigen.
b) Immunity one develops in a lifetime.
c) When most of the people became immune to an infectious disease.
d) Immunity that is borrowed from another source and lasts for short time.

Q.63) Solution (a)

Explanation:

Statement 1: **Natural or innate immunity** comprises the inborn immune mechanisms that do not depend upon previous exposure to an antigen. It is present from birth and is designed to protect the host from injury or infection without previous contact with the infectious agent.

Statement 2: **Acquired immunity** is immunity you develop over your lifetime. When pathogens (germs) are introduced into your body from a vaccine or a disease, your body learns to target those germs in the future by making new antibodies. It can come from:

- a vaccine
- exposure to an infection or disease
- another person's antibodies (infection-fighting immune cells)

Statement 3: **'Herd immunity', also known as 'population immunity', is the indirect protection from an infectious disease that happens when a population is immune either through vaccination or immunity developed through previous infection**. WHO supports achieving 'herd immunity' through vaccination, not by allowing a disease to spread through any segment of the population, as this would result in unnecessary cases and deaths.

Statement 4: **Passive immunity is "borrowed" from another source and it lasts for a short time.** For example, antibodies in a mother's breast milk give a baby temporary immunity to diseases the mother has been exposed to.

Q.64) Consider the following statements with reference to Non communicable diseases and

identify the incorrect statement:

a) More people die due to communicable diseases than non-communicable diseases globally.
b) Cardiovascular diseases account for most NCD deaths.
c) Two third of all NCD deaths occur in low- and middle-income countries
d) Diabetes, cancer, heart diseases and chronic lung disease, are collectively responsible for over 70% of all deaths worldwide.

Q.64) Solution (a)

Basic Information:

Non-communicable diseases (NCDs), also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behaviours factors.

The main types of NCDs are cardiovascular diseases (like heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes.

Explanation:

Key facts about NCDs:

- **Non-communicable diseases (NCDs) kill 41 million people each year, equivalent to 71% of all deaths globally.**
- Each year, 15 million people die from a NCD between the ages of 30 and 69 years; over 85% of these "premature" deaths occur in low- and middle-income countries.
- **Cardiovascular diseases account for most NCD deaths, or 17.9 million people annually**, followed by cancers (9.0 million), respiratory diseases (3.9million), and diabetes (1.6 million).
- These 4 groups of diseases account for over 80% of all premature NCD deaths.
- Tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets all increase the risk of dying from a NCD.
- Detection, screening and treatment of NCDs, as well as palliative care, are key components of the response to NCDs.
- **Non-communicable diseases (NCDs), including heart disease, stroke, cancer, diabetes and chronic lung disease, are collectively responsible for almost 70% of all deaths worldwide.**

- **Almost three quarters of all NCD deaths, and 82% of the 16 million people who died prematurely, or before reaching 70 years of age, occur in low- and middle-income countries.**

Q.65) Consider the following statements with reference to Reverse vaccinology:

1. Reverse vaccinology uses the expressed genomic sequences to find new potential vaccines.
2. The major advantage for reverse vaccinology is finding vaccine targets quickly and efficiently.

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.65) Solution (c)

Basic Information:

The term "reverse vaccinology" was proposed by Rappuoli (2000) and represents a genome-based approach to vaccine development. In comparison with the conventional approach, which requires a laborious process of selection of individual components important for immunity, reverse vaccinology offers the possibility of using genomic information derived from in silico analysis of sequenced organisms. This approach can significantly reduce the time necessary for the identification of candidate vaccines, and enables systematic identification of all potential antigens of pathogens, including those which are difficult or currently impossible to culture.

Explanation:

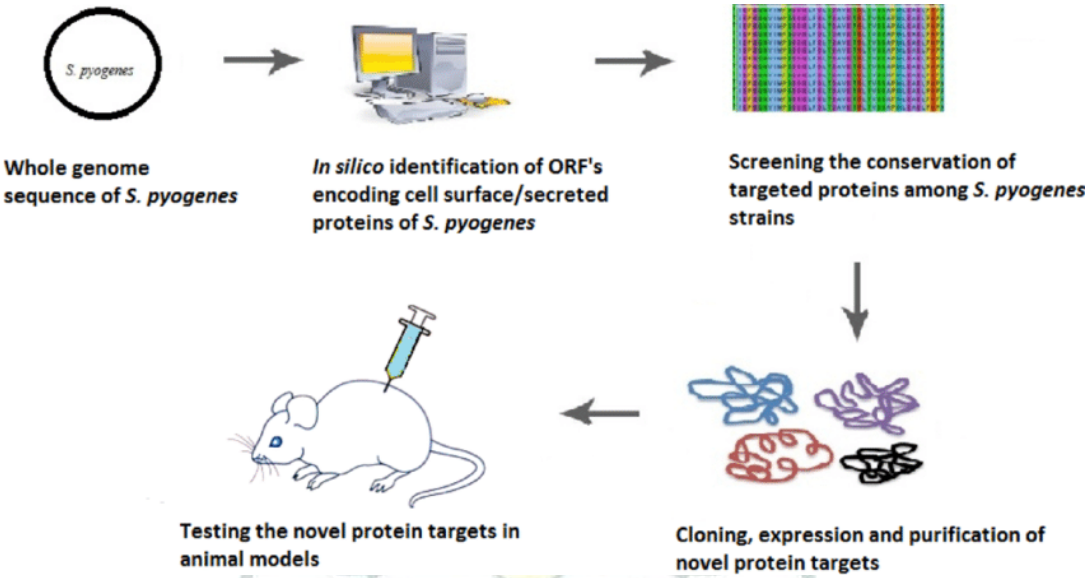
Reverse vaccinology uses the expressed genomic sequences to find new potential vaccines. Normal vaccines are created using the pathogenic organism. The term reverse refers to the use of expressed DNA over the purified proteins from the organism itself.

The major advantage for reverse vaccinology is finding vaccine targets quickly and efficiently. Traditional methods may take decades to unravel pathogens and antigens, diseases and immunity. Earlier, we had to do a viral culture in the laboratory to develop a vaccine, and this was time-consuming. The 'reverse vaccinology' technique has been available for the last 10 to

15 years.

Using 'reverse vaccinology', vaccinations were developed for meningococcal and staphylococcal infections all through the world, she added.

So, both statement is correct here.



Q.66) Consider the following statements about Virus:

1. Virus can only multiply inside the living cells of an organism
2. Virus are considered to borderline between living and non-living.
3. RNA viruses accumulate more genetic changes (mutations) than DNA viruses.

Which of the statements given above are correct?

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

Q.66) Solution (d)

Basic Information

Viruses are tiny infectious agents that invade host cells and cause disease. Although they are

harmful, viruses also have interesting technological potential. Viruses are microscopic biological agents that invade living hosts and infect their bodies by reproducing within their cell tissue.

Not only are viruses microscopic, they are smaller than many other microbes, such as bacteria. Most viruses are only 20–400 nanometers in diameter, whereas human egg cells, for example, are about 120 micrometers in diameter, and the E. coli bacteria has a diameter of around 1 micrometer. Viruses are so small that they are best viewed using an electron microscope, which is how they were first visualized in the 1940s.

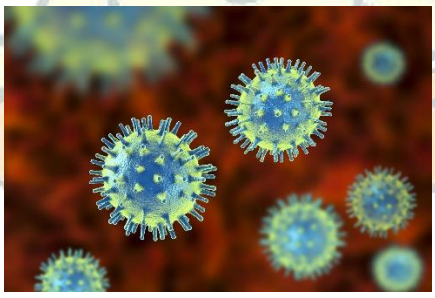
Explanation:

Statement 1: **Virus can only multiply inside the living cells of an organism.** They may use an animal, plant, or bacteria host to survive and reproduce. As such, there is some debate as to whether or not viruses should be considered living organisms. A virus that is outside of a host cell is known as a virion.

Statement 2: **Virus are considered at the borderline of living and non-living because they show characteristics of both living and non-living**. They react like non-living in free atmosphere and upon entering in body they show characteristics of living organism.

Statement 3: Like all life, viruses carry a genetic code in the form of nucleic acids — either DNA or RNA. When cells multiply, the DNA within them replicates as well, to make copies for the new cells. During replication, random errors are introduced into the new DNA, much like spelling errors when we write. Just as we can spell-check, our cells carry enzymes to 'proofread' and correct these mistakes to maintain the fidelity of our genetic material.

While the errors in DNA virus genomes can be corrected by the error-correcting function of cells in which they replicate, there are no enzymes in cells to correct RNA errors. **Therefore, RNA viruses accumulate more genetic changes (mutations) than DNA viruses.**



Q.67) Consider the following statements with reference to Middle East Respiratory syndrome:

1. It is a viral respiratory disease caused by a novel coronavirus.

2. Approximately 85% of reported patients with MERS-CoV infection have died
3. The virus does not seem to pass easily from person to person unless there is close contact.

Which of the statements given above are correct?

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

Q.67) Solution (c)

Explanation:

Middle East respiratory syndrome (MERS) **is a viral respiratory disease caused by a novel coronavirus** (Middle East respiratory syndrome coronavirus, or MERS-CoV) that was first identified in Saudi Arabia in 2012.

- Coronaviruses are a large family of viruses that can cause diseases ranging from the common cold to Severe Acute Respiratory Syndrome (SARS).
- Typical MERS symptoms include fever, cough and shortness of breath. Pneumonia is common, but not always present. Gastrointestinal symptoms, including diarrhoea, have also been reported. Some laboratory-confirmed cases of MERS-CoV infection are reported as asymptomatic, meaning that they do not have any clinical symptoms, yet they are positive for MERS-CoV infection following a laboratory test. Most of these asymptomatic cases have been detected following aggressive contact tracing of a laboratory-confirmed case.
- **Approximately 35% of reported patients with MERS-CoV infection have died. (So, statement 2 is incorrect here.)**
- Although most of human cases of MERS-CoV infections have been attributed to human-to-human infections in health care settings, current scientific evidence suggests that dromedary camels are a major reservoir host for MERS-CoV and an animal source of MERS infection in humans. However, the exact role of dromedaries in transmission of the virus and the exact route(s) of transmission are unknown.
- **The virus does not seem to pass easily from person to person unless there is close contact, such as occurs when providing unprotected care to a patient.** Health care associated outbreaks have occurred in several countries, with the largest outbreaks seen in Saudi Arabia, United Arab Emirates, and the Republic of Korea.

Q.68) Consider the following pairs about Hormone and their function:

Hormone* : : *function

1. Serotonin : : stabilises mood, feeling and wellbeing.
2. Insulin : : helps in regulating blood sugar level in body.
3. Adrenaline : : elevates blood pressure and boosts energy supplies.

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.68) Solution (d)

Basic Information

Hormone, organic substance secreted by plants and animals that functions in the regulation of physiological activities and in maintaining homeostasis. Hormones carry out their functions by evoking responses from specific organs or tissues that are adapted to react to minute quantities of them. The classical view of hormones is that they are transmitted to their targets in the bloodstream after discharge from the glands that secrete them. This mode of discharge (directly into the bloodstream) is called endocrine secretion.

Explanation:

Statement 1**: Serotonin is the key hormone that stabilizes our mood, feelings of well-being, and happiness.** This hormone impacts your entire body. It enables brain cells and other nervous system cells to communicate with each other. Serotonin also helps with sleeping, eating, and digestion. Due to imbalance of this hormone, brain does not produce enough hormone to regulate mood which results in depression, weight gain, migraine etc.

Statement 2: Insulin is released by Pancreas, it is considered to be the main anabolic hormone of the body. It regulates the metabolism of carbohydrates, fats and protein by promoting the absorption of glucose from the blood into liver, fat and skeletal muscle cells. Basically, **insulin helps regulate blood sugar levels.**

Statement 3**:** Adrenaline, also known as epinephrine, is a hormone and medication which is involved in regulating visceral functions. Adrenaline is normally produced both by the adrenal

glands and by a small number of neurons in the medulla oblongata**. Adrenaline increases your heart rate, elevates your blood pressure and boosts energy supplies.**

Q.69) Consider the following statements with reference to Adjuvant (ingredient used in some vaccines):

1. It is pharmacological or immunological agent that reduces the immune response of a vaccine.
2. The precise mechanisms of many adjuvants remain largely undefined.

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.69) Solution (b)

Basic information:

An adjuvant is an ingredient used in some vaccines that helps create a stronger immune response in people receiving the vaccine. In other words, adjuvants help vaccines work better. Some vaccines that are made from weakened or killed germs contain naturally occurring adjuvants and help the body produce a strong protective immune response. However, most vaccines developed today include just small components of germs, such as their proteins, rather than the entire virus or bacteria. Adjuvants help the body to produce an immune response strong enough to protect the person from the disease he or she is being vaccinated against. Adjuvanted vaccines can cause more local reactions (such as redness, swelling, and pain at the injection site) and more systemic reactions (such as fever, chills and body aches) than non-adjuvanted vaccines.

Adjuvants affect the immune response in various ways:

- To increase the immunogenicity of weak antigens
- To enhance speed and duration of immune response
- To stimulate and modulate humoral responses, including antibody isotype
- To stimulate cell-mediated immunity
- To improve induction of mucosal immunity

- Enhance immune responses in immunologically immature patients, particularly infants
- To decrease the dose of antigen required; reducing costs and eliminating inconvenient requirements for booster shots.

Statement 2: **The precise mechanisms of many adjuvants remain largely undefined due to the complexity of the immune response**, but generalisations can be made to allow the design of more rational adjuvants aimed at particular arms of the immune system.

Q.70) With reference to plant tissues, consider the following statements:

1. Pholem is a plant tissue specially designed for transporting water and nutrients.
2. Xylem tissues in plants carries foods made in the leaves to all other parts of the plant.

Which of the above statements is/are correct?

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

Q.70) Solution (d)

Explanation:

The complex tissues in a plant deal with moving nutrients and water to the leaves, while removing the products of photosynthesis from the leaves. Photosynthesis produces the sugar glucose. Modified and bound to other 6-carbon sugars, the substance becomes sucrose or a variety of other disaccharides. In this form it can be moved with small amounts of water and can be transported efficiently throughout the plant. The complex tissues of the plant aid in this overall effort to supply the roots with food as they supply the leaves with water and nutrients.

The two main forms of plant tissue used in this process are xylem and phloem. Xylem is a plant tissue specially designed for transporting water and nutrients. This plant tissue can come in several forms, depending on the species. Sometimes, the xylem plant tissue is made up of a long chain of small tubes, called vessels, which interconnect and allow water to travel through unimpeded.

Like the xylem, the phloem consist of a variety of different cell types which work together to produce a continual interconnected passageway connecting cells of the plant**. The phloem, rather than bringing water up from the roots, needs to carry sugar down to the roots and**

stems. With a little water from the xylem, it can complete this process. It is further aided by companion cells, which surround the actual sieve-tube. The whole structure is then supported by phloem fibers, which give the tube shape and structure.

Q.71) Which of the following diseases are infectious?

1. Dengue
2. Chikungunya
3. Rotavirus
4. Hepatitis A

Select the correct code

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

Q.71) Solution (d)

Explanation:

Infectious diseases are diseases caused by living organisms like viruses and bacteria. They can be passed from person to person through body secretions, insects or other means. Diseases which are spread from animals to humans, such as avian influenza, are known as zoonotic diseases.

Examples of infectious diseases include SARS, influenza, the common cold, tuberculosis (TB), Dengue, Chikugunya, Rotavirus, Hepatitis A and B.

Q.72) Consider the following statements describing about particular disease

1. It is contagious and highly fatal animal diseases.
2. Mortality is close to 100 percent in it.
3. It is not a threat to human beings since it only spreads from animals to other animals.

Identify the appropriate disease:

a) Yellow fever

b) African swine fever
c) Brucellosis
d) Nipah Virus

Q.12) Solution (b)

Explanation:

Statement 1: **Yellow fever is a serious, potentially deadly flu-like disease spread by Aedes aegypti mosquitoes, which also transmit dengue and Zika viruses.** It's characterized by a high fever and jaundice. Jaundice is yellowing of the skin and eyes, which is why this disease is called yellow fever. This option is eliminated since Yellow fever is found among Humans.

Statement 2: the diseases being referred here is African swine fever, it was first detected in Africa in 1920s. It has been recently seen in Asian Countries like China, Philippines and even in India**. African Swine Fever (ASF) does not affect humans but can be catastrophic for pigs**. The current outbreak of ASF in India is the first time that the disease has been reported in the country. **ASF is a severe viral disease that affects wild and domestic pigs typically resulting in an acute haemorrhagic fever. The disease has a case fatality rate (CFR) of almost 100 per cent.** Its routes of transmission include direct contact with an infected or wild pig (alive or dead), indirect contact through ingestion of contaminated material such as food waste, feed or garbage, or through biological vectors such as ticks. The disease is characterised by sudden deaths in pigs.

Statement 3: **Brucellosis is a bacterial diseases which can spread from animals to humans mostly by unpasteurized dairy products**.

Statement 4: **Nipah Virus is a zoonotic diseases that affect both human and animals**. It was first identified in 1999 in Malaysia and Singapore. Currently no vaccine is available for its treatment.

Q.73) Which of the statements given below is/are correct differences between angiosperm and gymnosperm (two major groups of vascular seed plants)?

1. Gymnosperm are seed producing while angiosperm do not produce seeds.
2. Angiosperms are generally bisexual and rarely unisexual while gymnosperm are generally unisexual and rarely bisexual.

Select the correct code:

a) 1 only

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

Q.73) Solution (b)

Basic information:

Angiosperms and gymnosperms are the two major groups of vascular seed plants. Angiosperms, which are flowering plants, are the largest and most diverse group within the kingdom Plantae. With around 300,000 species, they represent approximately 80 percent of all the known green plants now living. Gymnosperms are a smaller, more ancient group, and it consists of plants that produce "naked seeds" (seeds that are not protected by a fruit). There are more than 1,000 species of gymnosperms still found on Earth.

Explanation:

Statement 1: **Both Angiosperm and Gymnosperm are seed producing,** they key difference between them is how their seeds are developed. Angiosperm seeds are enclosed within an ovary (usually a fruit), while gymnosperms have no flowers or fruits, and have unenclosed or "naked" seeds on the surface of scales or leaves. Gymnosperm seeds are often configured as cones.

Statement 2: **Angiosperm are generally bisexual and rarely unisexual, while gymnosperm is generally unisexual and rarely bisexual.** Angiosperms are also the source of the world's hardwoods. Flowering plants are economically important as they serve as a source of pharmaceuticals, timber, ornamentals, fiber products, and other commercial uses, whereas gymnosperms are known for providing softwoods such as pine, fir and use to make paper, lumber, and plywood.

Q.74) Which of the following are characteristics of enzymes?

1. Enzymes are highly specific in their action
2. Enzymes activity in body is independent of body temperature and pH.
3. Enzymes are mostly protein that act as biological catalyst in body.

Select the correct code

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

d) 1, 2 and 3

Q.74) Solution (b)

Basic information

Enzymes are proteins and the properties and characteristics they exhibit reflect properties of protein. They are organic catalysts that speed up biological reactions especially in digestion and metabolism of food substances.

Statement analysis:

Statement 1: **Enzymes are much more specific in the reactions they catalyze** than inorganic catalysts. However, the degree of catalytic specificity varies from one enzyme to the other. Most intracellular enzymes work on a particular substrate while some digestive enzymes work on a comparatively wide range of substrates that are related.

Statement 2: **Since enzymes are proteins, they are averse to excessive heat. This is because enzymes get denatured when exposed to high temperatures** and that explains why very few cells can tolerate temperatures that exceed 45 degrees centigrade. Organisms that live in environment where the prevailing temperature exceeds 45 degrees centigrade either have heat-resistant enzymes or a capable of regulating their body temperature. A perfect example of an organism with heat-resistant enzymes is the blue-green algae that live in hot springs at temperatures of 100 degrees centigrade.

Enzymes operate at specific pH ranges and any alterations can adversely affect their action and efficiency. Most intracellular enzymes function best at neutral pH. Interestingly, certain digestive enzymes prefer a distinctly alkaline or acidic environment.

So, **statement 2 is incorrect here.**

Statement 3: **Enzymes are mostly proteins that acts as biological catalysts in body. Enzymes accelerate chemical reactions.** Almost all metabolic processes in the cell need enzyme catalysis in order to occur at rates fast enough to sustain life. Some enzymes are used commercially; for example, in the synthesis of antibiotics. However, enzymes in general are limited in the number of reactions they have evolved to catalyse, and by their lack of stability in organic solvents and at high temperatures.

Q.75) Consider the following statements and identify the incorrect statement:

a) India has the second largest number of tobacco users in the world
b) Kerala is known as the 'diabetes capital of India'.

c) Kala-azar is endemic to Indian subcontinent.
d) None

Q.75) Solution (d)

Explanation:

Incorrect statement is being asked here.

Statement 1: **India has the second largest tobacco-using population in the world after China.** According to WHO, tobacco kills more than 1 million people each year in India, accounting for 9.5% of all deaths.

Statement 2: **Kerala is known as diabetes capital of India as prevalence of diabetes is high** i.e. 20% which is double the national average of 8%. As compared, the prevalence in Thiruvananthapuram was 17%, in Hyderabad & New Delhi 15%, in Nagpur 4% and in Dibrugarh 3%.

Statement 3: Kala-azar is a disease caused by infection with leishmania parasite. **The disease is endemic in Indian subcontinent in 119 districts in four countries namely Bangladesh, Bhutan, India and Nepal.** India alone accounts for about 50% of the global burden of KA. Though KA is one of the most dangerous neglected tropical diseases (NTDs), it is amenable to elimination as a public health problem.

Q.76) Consider the below statements about protozoa:

1. They can be either free-living or parasitic
2. They are not found in fresh water.
3. Some examples of protozoa are Amoeba, Paramecium, Euglena and Trypanosoma.

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.76) Solution (b)

Explanation:

Statement 1 and 3**: Protozoa is an informal term for a group of single-celled eukaryotes, either free-living or parasitic,** which feed on organic matter such as other microorganisms or organic tissues and debris. Historically, protozoans were regarded as "one-celled animals", because they often possess animal-like behaviours, such as motility and predation, and lack a cell wall, as found in plants and many algae. Although the traditional practice of grouping protozoa with animals is no longer considered valid, the term continues to be used in a loose way to describe single-celled protists that feed by heterotrophy. **Some examples of protozoa are Amoeba, Paramecium, Euglena and Trypanosoma.**

Statement 2: **Free-living protozoans are common and often abundant in fresh, brackish and salt water, as well as in other moist environments,** such as soils and mosses. Some species thrive in extreme environments such as hot springs and hypersaline lakes and lagoons. All protozoa require a moist habitat; however, some can survive for long periods of time in dry environments, by forming resting cysts which enable the protozoa to remain dormant until conditions improve.

So, statement 2 is incorrect here.

Q.77) The term 'Superbug' is associated with

a) Computer Trojan
b) ATP
c) Virus
d) Antimicrobial resistance

Q.77) Solution (d)

Explanation:

A superbug is usually defined as a microorganism that's resistant to commonly used antibiotics – but not all superbugs are created equal. The number of different antibiotics to which it can be resistant determines the degree of the superbug.

Antimicrobial Resistance (AMR) occurs when bacteria, viruses, fungi and parasites change over time and no longer respond to medicines making infections harder to treat and increasing the risk of disease spread, severe illness and death. As a result, the medicines become ineffective and infections persist in the body, increasing the risk of spread to others.

Q.78) Which of the following is/are not correct about haemoglobin:

1. It transfers oxygen from the lungs to the needy tissues of the body.
2. It is only found in Red Blood Cells.

Choose the correct code:

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

Q.78) Solution (b)

Explanation:

Haemoglobin is the iron-containing oxygen-transport metalloprotein in the red blood cells (erythrocytes) of almost all vertebrates.

- Hemoglobin in blood carries oxygen from the lungs or gills to the rest of the body (i.e. the tissues). There it releases the oxygen to permit aerobic respiration to provide energy to power the functions of the organism in the process called metabolism.
- **Hemoglobin is essential for transferring oxygen in your blood from the lungs to the tissues.**
- In mammals, the protein makes up about 96% of the red blood cells' dry content (by weight), and around 35% of the total content (including water).
- Hemoglobin is involved in the transport of other gases: It carries some of the body's respiratory carbon dioxide as carbaminohemoglobin, in which CO_2 is bound to the globin protein. (Largest amount of CO_2 produced in the cell are carried to the lungs as bicarbonate ions dissolved in the plasma).
- **Hemoglobin is also found outside red blood cells.** In these tissues, hemoglobin has a nonoxygen-carrying function as an antioxidant and a regulator of iron metabolism.

Q.79) Which among the following disease is latest to be eliminated from India according to WHO?

a) Trachoma
b) Polio
c) Small Pox
d) Yaws

Q.79) Solution (d)

Explanation:

Trachoma is a disease caused by poor environmental and personal hygiene and inadequate access to water and sanitation. It affects the conjunctiva which lines the inside of the eyelids. Repeated infections can cause scarring, leading to in-turning of the eyelashes and eyelids. This further causes damage to the cornea and blindness. The disease is found to be affecting the population in certain pockets of north Indian states like Gujarat, Rajasthan, Punjab, Haryana, Uttar Pradesh and the Nicobar Islands. **Indian Ministry of Health and Female welfare declared that India is free from it in December 2017, but it is yet to be Validated by WHO.**

Polio is a highly infectious — but preventable — disease that is 99.9% eradicated**. On March 27, 2014, India and the entire WHO South-East Asia Region were officially declared as being polio-free.**

The 1974 smallpox epidemic of India was one of the worst smallpox epidemics of the 20th century and occurred three years before smallpox was eradicated. Small pox has been eliminated across the world, after one last outbreak in Somalia in the late 1980s**. India eradicated smallpox in April 1977.**

Yaws is a chronic infection that affects mainly the skin, bone and cartilage. This disease occurs mainly in poor communities in warm, humid, tropical areas. It mainly affects children below age of 15. **India was declared free from this diseases in 2016.**

Q.80) With reference to Corona Virus, consider the following statements?

1. It is RNA based Virus.
2. It was first detected in Wuhan
3. SARS-CoV-2 has spike proteins which contain a receptor-binding domain (RBD).

Which of the statements given above is/are *incorrect*?

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

Q.80) Solution (d)

Explanation:

Coronaviruses are a specific family of viruses, with some of them causing less-severe damage, such as the common cold, and others causing respiratory and intestinal diseases. A coronavirus has many "regularly arranged" protrusions on its surface, because of which the entire virus particle looks like an emperor's crown, hence the name "coronavirus".

Apart from human beings, coronaviruses can affect mammals including pigs, cattle, cats, dogs, martens, camels, hedgehogs and some birds. So far, there are four known disease-causing coronaviruses, among which the best known are the SARS corona virus and the Middle East Respiratory Syndrome (MERS) coronavirus, both of which can cause severe respiratory diseases. **The Covid -19 was 1st detected in Wuhan (China).**

A receptor-binding domain (RBD) is a key part of a virus located on its 'spike' domain that allows it to dock to body receptors to gain entry into cells and lead to infection. These are also the primary targets in the prevention and treatment of viral infections, including SARS-CoV-2 – the virus that causes COVID-19.

Coronaviruses are spherical shaped and consist of a core of genetic material (RNA) surrounded by an envelope with mushroom shaped protein spikes. These spikes binds and fuses to human cells allowing the virus to gain entry and replicate itself inside the body.

Coronaviruses are spherical shaped and consist of a core of genetic material (RNA) surrounded by an envelope with mushroom shaped protein spikes.

Q.81) With reference to GROWTH –India Telescope, consider the following statements?

1. It is India's first robotic telescope.
2. It is part of the international GROWTH (Global Relay of Observatories) Watching Transients Happen) network.

Which of the above statements is/are correct?

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

Q.81) Solution (c)

Statement analysis

Statement 1: **GROWTH-India is India's first fully robotic optical research telescope**. This was

constructed as a joint partnership between the Indian Institute of Astrophysics and the Indian Institute of Technology Bombay, with support from DST-SERB and IUSSTF. The primary research focus of this telescope is time domain astronomy: the study of explosive transients and variable sources in the universe.

- The telescope is located at the Indian Astronomical Observatory site at Hanle, Ladakh. Situated at 4500 meters above mean sea level, this is one of the highest observatory sites in the world and one of the best telescope locations in the country.
- It is mainly an imaging telescope.
- It is 70m telescope with a primary focus on time domain astronomy.

Statement 2**:** **it is a part of the international GROWTH network:** a Global Relay of Observatories Watching Transients Happen. Together with various partners around the world, it continuously monitor any interesting object in the sky - uninterrupted by daylight.

- The GROWTH initiatives focuses on three scientific themes in the field of time-domain astronomy –cosmic explosions (supernova), small near earth asteroids and the electromagnetic identification of gravitational wave sources.

Q.82) Consider the following statements:

1. Bepicolombo is a joint mission of NASA and European space agency to explore Mercury.
2. Parker Solar Probe is first to fly in Sun's direct atmosphere called Corona.
3. Tiangong-2 is China's first Mars exploration mission.

Which of the above statements is/are correct?

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

Q.82) Solution (c)

Explanation:

Statement 1: BepiColombo is Europe's first mission to Mercury, the smallest and least explored terrestrial planet in our Solar System.

- It is a joint endeavour between ESA and the Japan Aerospace Exploration Agency, JAXA, and consists of two scientific orbiters: ESA's Mercury Planetary Orbiter (MPO) and JAXA's Mercury Magnetospheric Orbiter (MMO). (So, statement 1 is incorrect.)
- The mission will study all aspects of Mercury, from the structure and dynamics of its magnetosphere and how it interacts with the solar wind, to its internal structure with its large iron core, and the origin of the planet's magnetic field. It will make global maps of the surface elemental and chemical composition and image features to better understand geological processes and how the surface has been modified over time by impact craters, tectonic activity, volcanism and polar ice deposits.
- The data will enable scientists to understand more about the origin and evolution of a planet located close to its parent star, and a better understanding of the overall evolution of our Solar System.

Statement 2: NASA's Parker Solar Probe is the first-ever mission to "touch" the Sun. It is part of NASA's "Living With a Star" programme that explores different aspects of the Sun-Earth system.

- The spacecraft, about the size of a small car, travels directly through the Sun's atmosphere --ultimately to a distance of about 4 million miles from the surface.
- The mission's central aim is to trace how energy and heat move through the Sun's corona and to study the source of the solar wind's acceleration.
- The mission is likely to last for seven years during which it will complete 24 orbits.
- **It is first to fly direct into the outermost atmosphere of Sun known as Corona.**

Statement 3: **Tianwen -1 is China's first Mars exploration mission.** Mission includes an orbiting spacecraft, landing craft and a detachable rover to roam the Martian surface. Tiangong-2 was a Chinese space laboratory and part of the Project 921-2 space station program. (**So, statement 3 is incorrect.)**

Q.83) Consider the following statements about Sun Spots Cycle:

1. Sunspot is an area on the Sun that appears dark on the surface and is relatively cooler than surrounding parts.
2. Sunspots usually appear in pairs of opposite magnetic polarity.

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.83) Solution (c)

Explanation:

Statement1**: A Sunspot is an area on the Sun that appears dark on the surface and is relatively cooler than surrounding parts.** These spots, some as large as 50,000 km in diameter, are the visible markers of the Sun's magnetic field, which forms a blanket that protects the solar system from harmful cosmic radiation.

- On the photosphere– the outer surface of the Sun which radiates heat and light– Sunspots are the areas where the star's magnetic field is the strongest; around 2,500 times more than the Earth's magnetic field.
- Most Sunspots appear in groups that have their own magnetic field, whose polarity reverses during every solar cycle, which takes around 11 years. In every such cycle, the number of Sunspots increases and decreases.
- **Sunspots usually appear in pairs of opposite magnetic polarity.**
- Larger sunspots can be visible from Earth without the aid of a telescope.

Why Sunspots appear dark?

Because Sunspots have high magnetic pressures, the atmospheric pressure in the surrounding photosphere reduces, inhibiting the flow of hot gases from inside the Sun to the surface.

- Due to this, the temperatures of Sunspots are thousands of degrees lower than the surrounding photosphere, which has a temperature of 5,800 degrees Kelvin. Sunspots temperatures are around 3,800 degrees Kelvin.
- Because they stop the convective flow of heat and light, Sunspots appear dark. They typically consist of a dark region called the 'umbra', which is surrounded by a lighter region called the 'penumbra'.

Q.84) Consider the following statements about Infectious disease diagnostic lab.

1. It is India's first Mobile testing Lab which is part of Atmanirbhar Bharat.
2. It has been launched by Ministry of Science & Technology.

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.84) Solution (c)

Explanation

I-Lab (Infectious disease diagnostic lab)

- **It is india's first mobile testing facility launched under Atmanirbhar Bharat.**
- It **is supported by Department of Biotechnology under Ministry of Science and Technology**
- This mobile testing facility will be deployed through the DBT testing hubs to remote regions of the country for Covid testing.
- The unique feature of these mobile testing labs is their utility in diagnosing other infectious diseases beyond the Covid period.
- The labs will be provided to the regional/City hubs and they will deploy it further in the interior, inaccessible parts of the region.

Q.85) For which of the following diseases Vaccines are available?

1. Diptheria
2. Tetanus
3. Polio
4. Measles
5. Hepatitis A

Select the correct code

a) 1, 2, and 3 only
b) 2, 3 and 4 only
c) 1, 2, 3 and 4 only
d) All of the above

Q.85) Solution (d)

Explanation:

Vaccines are available for many dangerous or deadly diseases. Over the years, these vaccines have prevented countless cases of disease and saved millions of lives. Infants, children, adolescents, teens and adults need different vaccinations, depending on their age, location, job, lifestyle, travel schedule, health conditions or previous vaccinations.

The vaccines are available for Chickenpox (Varicella), **Diphtheria**, Flu (Influenza**), Hepatitis A** , Hepatitis B, Hib (Haemophilus influenzae type b), HPV (Human Papillomavirus), **Measles**, **Meningococca**l, Mumps, Pneumococcal, **Polio** (Poliomyelitis), Rotavirus, Rubella (German Measles), Shingles (Herpes Zoster), **Tetanus** (Lockjaw), Whooping Cough (Pertussis)

Q.86) Consider the following statements:

1. Photons are the most widely occurring particle in universe.
2. Plasma is the fourth state of matter after solid, liquid and gas.
3. The fifth state of matter Bose – Einstein condensate is man-made.

Which of the statements given above is/are correct?

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

Q.86) Solution (d)

Explanation:

Statement 1: Photon is a type of elementary particle. It is the quantum of the electromagnetic field including electromagnetic radiation such as light and radio waves, and the force carrier for the electromagnetic force. Photons are massless, so they always move at the speed of light in vacuum. **The light particles Photons are the most abundant particle in universe followed by Neutrionos.**

Statement 2: Matter is the "stuff" that makes up the universe — everything that takes up space and has mass is matter. All matter is made up of atoms, which are in turn made up of protons, neutrons and electrons. Atoms come together to form molecules, which are the building blocks for all types of matter.

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

- Plasma is not a common state of matter here on Earth, but it may be the most common state of matter in the universe.
- Plasma consists of highly charged particles with extremely high kinetic energy.
- The noble gases (helium, neon, argon, krypton, xenon and radon) are often used to make glowing signs by using electricity to ionize them to the plasma state.

Statement 3: **the fifth state of matter is Bose –Einstein condensate which was created by scientists in 1995.** Using a combination of lasers and magnets. A BEC is used to study quantum mechanics on a macroscopic level. Light appears to slow down as it passes through a BEC, allowing scientists to study the particle/wave paradox. A BEC also has many of the properties of a superfluid, or a fluid that flows without friction. BECs are also used to simulate conditions that might exist in black holes.

So, all statements are correct.

Q.87) Consider the following statements regarding GEMINI:

1. It is a satellite based advisory service for Indian Farmers.
2. It receives and transfers data received from Gagan Satellite to a mobile through Bluetooth connection.

Which of the above statements is/are *incorrect*?

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

Q.87) Solution (a)

Explanation:

Gagan Enabled Mariner's Instrument for Navigation and Information (GEMINI) is a satellite based advisory service for **Indian fisherman. (So, statement 1 is incorrect)**

- To receive the messages transmitted through the GAGAN satellites, INCOIS together with AAI developed a low-cost GAGAN system-enabled GEMINI (GAGAN Enabled Mariner's Instrument for Navigation and Information) device and electronically

designed and manufactured by a private industry M/S Acord, Bangalore under Make in India Program.

- **The GEMINI device receives and transfers the data received from GAGAN satellite/s to a mobile through Bluetooth communication**. A mobile application developed by INCOIS decodes and displays the information in nine regional languages. (**So, statement 2 is correct here.)**
- It utilize the GAGAN (GPS Aided Geo Augmented Navigation) satellite system to transmit the PFZ, OSF and disaster warnings to fishermen with GAGAN system consisting of three geosynchronous satellites (GSAT-8, GSAT-10 and GSAT-15).
- GAGAN foot-print covers the entire Indian Ocean round the clock.
- This is in consonance with an effort to achieve Blue Revolution. The Meena Kumari Committee had recommended optimum utilization of the Exclusive Economic Zone (EEZ)— sea between 22 and 370 km from the coast.

Q.88) Consider the following statements regarding zoonotic diseases:

1. These are diseases which spread from Animals to humans.
2. More than half of human infection are estimated to have an animal origin.
3. Zoonotic diseases can be bacterial, parasitic or viral in nature.

Which of the statements given above are correct?

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

Q.88) Solution (d)

Explanation:

Zoonosis or zoonotic disease is a disease that has passed into the human population from an animal source directly or through an intermediary species. Zoonotic infections **can be bacterial, viral, or parasitic in nature,** with animals playing a vital role in maintaining such infections. Examples of zoonosis include HIV-AIDS, Ebola, Lyme Disease, malaria, rabies, West Nile fever, and the current novel coronavirus disease (COVID-19) disease.

The report on Zoonotic diseases by and the International Livestock Research Institute (ILRI) and

UNEP argues:

- **About 60 per cent of known infectious diseases in humans and 75 per cent of all emerging infectious diseases are zoonotic,**
- It identified seven anthropogenic driving factors leading to the emergence of zoonotic diseases — increased demand for animal protein; rise in intense and unsustainable farming; the increased use and exploitation of wildlife; unsustainable utilisation of natural resources; travel and transportation, changes in food supply chains and the climate change crisis.
- Moreover, loss of forest cover for agricultural purposes such as growing of soy, used as a key constituent of animal feed, is also influencing the emergence of zoonotic diseases by increasing human access to wildlife.
- The UNEP and ILRI emphasised on the importance of a 'One-Health' approach to manage and prevent zoonotic disease outbreaks and pandemics, occurring at the interface of human, animal and environment health.

So, all the three statements are correct.

Q.89) Consider the following pairs

	Space Mission	**:**	**Country**
1.	Hope Probe	:	Saudi Arabia
2.	Beresheet	:	Israel
3.	Ravana 1	:	Sri Lanka

Which of the above pairs is/are correct?

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

Q.89) Solution (b)

Statement Analysis:

Statement 1 **The United Arab Emirates' first mission to Mars entered the orbit of the red**

planet, seven months after the Emirati-built 'Hope Probe' was launched from Tanegashima in Japan. With this, the UAE has become the fifth country after the US, Russia, China, the EU, and India, to reach the Martian orbit. Hope is the UAE's fourth space mission and first interplanetary one. The previous three were all Earth-observation satellites. (**So, statement 1 is incorrect)**

Statement 2: **Beresheet was Israel's first lunar mission and the first attempt by a private company to land on the Moon.** The mission achieved lunar orbit, but was lost during an April 2019 landing attempt. NASA had installed a small laser retroreflector aboard the lander to test its potential as a navigation tool.

Statement 3: **Raavana 1 is a Sri Lankan low orbit cube research satellite** and the second satellite of Sri Lanka after SupremeSAT-1 launched in 2012. The satellite was launched as part of Cygnus NG-11 by the United States on 17 April 2019.

Q.90) Consider the following statements regarding international finance facility for immunization:

1. It is an International Medico-Humanitarian NGO with a headquarter in Geneva.
2. It issues Vaccine bonds on capital market against Long term donor pledges.

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.90) Solution (b)

Explanation:

The concept of an International Finance Facility (IFF) first was proposed by HM Treasury in conjunction with the Department for International Development of the United Kingdom.

- An IFF is designed to frontload aid to help meet the Millennium Development Goals.
- The first IFF is the "International Finance Facility for Immunisation" (IFFIm), begun by France, the UK and other European **countries in 2006 with headquarter in London.**
- IFFIm was initiated to rapidly accelerate the availability and predictability of funds for immunisation.

- **IFFIm sells bonds - officially called Vaccine Bonds - on the capital markets to raise funds for the GAVI Alliance,** a public-private partnership which works to save children's lives and protect people's health by increasing access to vaccination in developing countries. (**So, only statement 2 is correct here)**

Q.91) Which of the following statements are NOT correct with reference to intensified Mission Indradhanush?

1. It seeks to further intensify universal Immunization Programme.
2. It aims to reach each and every child up to five years of age and pregnant women left uncovered under immunization program.
3. IMI – 2.0 will target the districts which have immunisation coverage of 70% or below.

Select the appropriate option:

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

Q.91) Solution (b)

Basic Information:

Immunization Programme in India was introduced in 1978 as 'Expanded Programme of Immunization' (EPI) by the Ministry of Health and Family Welfare, Government of India. In 1985, the programme was modified as 'Universal Immunization Programme' (UIP) to be implemented in phased manner to cover all districts in the country by 1989-90 with the one of largest health programme in the world. Despite being operational for many years, UIP has been able to fully immunize only 65% children in the first year of their life.

Statement Analysis:

Statement 1 and 2**: To further intensify the Universal immunization programme**, Prime Minister Shri Narendra Modi launched the Intensified Mission Indradhanush (IMI) on October 8, 2017. **Through this programme, Government of India aims to reach each and every child up to two years of age and all those pregnant women who have been left uncovered under the routine immunisation programme/UIP**. The focus of special drive was to improve immunisation coverage in select districts and cities to ensure full immunisation to more than 90% by December 2018. (**So, statement 1 is correct and Statement 2 is incorrect)**

Statement 3: IMI 2.0, the second phase of the initiative launched on October 31, 2019. Immunisation is set to be carried out in 271 districts **across the country where fewer than 70% infants are currently vaccinated.**

The scheme, which aims to achieve the target by March 2020, will especially focus on 652 blocks across 109 districts in Uttar Pradesh and Bihar – both among India's worst performers on immunisation coverage.

The salient features of IMI 2.0 are:

- Conduction of four rounds of immunization activity over 7 working days excluding the RI days, Sundays and holidays.
- Enhanced immunization session with flexible timing, mobile session and mobilization by other departments.
- Enhanced focus on left outs, dropouts, and resistant families and hard to reach areas.
- Focus on urban, underserved population and tribal areas.
- Inter-ministerial and inter-departmental coordination.
- Enhance political, administrative and financial commitment, through advocacy.
- IMI 2.0 drive is being conducted in the selected districts and urban cities between Dec 2019 – March 2020

A portal named Intensified Mission Indradhanush 2.0(https://imi2.nhp.gov.in/AboutUs) has been designed to manage the data reporting by different ministries/ departments, and to capture pre-campaign activities, activities during immunization rounds and post campaign indicators on immunization coverage**.**

Q.92) Consider the following statements with reference to Nag Missile:

3. It is India's third generation anti- tank guided missile
4. Development of the Nag is part of the Integrated Guided Missile Development Program (IGMDP)

Select the correct answer using the code below:

a) 1 only
b) 2 only
c) Both 1 and 2
d) None of the above

Q.92) Solution (c)

Explanation:

Nag Missile:

- **It is an Indian third-generation, all-weather, fire-and-forget, lock-on after launch, anti-tank guided missile (ATGM) with an operational range of 500 m to 20 km.**
- **Development of the Nag is part of the Integrated Guided Missile Development Program (IGMDP), run by Defence Research and Development Organisation (DRDO**).
- ATGM NAG has been developed by DRDO to engage highly fortified enemy tanks in day and night conditions.
- The NAG missile carrier NAMICA is a BMP II based system with amphibious capability. With this final user trial, NAG will enter into production phase.
- The missile will be produced by Defence PSU Bharat Dynamics Limited (BDL), whereas Ordnance Factory Medak will produce the NAMICA.

So, both statements are correct.

Q.93) **With reference to National defence fund, consider the following statements**

1. It was established after Kargil war for the welfare of armed force personal and their dependents.
2. It is administered by an executive committee with PM as a chairman.
3. It is entirely dependent on voluntary contribution from public.

Which of the statements given above are correct?

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

Q.93) Solution (b)

Explanation:

National Defence Fund:

- **The fund was setup in the year 1962 to take charge of voluntary donations in cash and kind received for promotion of the national defence effort, and to decide on their utilisation.** The Fund is used for the welfare of the members of the Armed Forces (including Para Military Forces) and their dependents. (**So, statement 1 is incorrect.)**
- The **Fund is administered by an Executive Committee, with PM as Chairperson**, and Defence, Finance and Home Ministers as Members. Finance Minister is the Treasurer of the Fund and the Joint Secretary, PMO dealing with the subject is Secretary of the Executive Committee. Accounts of the Fund are kept with the Reserve Bank of India.
- **The fund is entirely dependent on voluntary contributions from the public and does not get any budgetary support**.
- Schemes under the National Defence Fund
    - A scholarship scheme to encourage technical and post-graduation education for the widows and wards of the deceased personnel of Armed Forces, Para Military Forces, all State Police and Railway Protection Force is being implemented.
    - The scheme is being implemented by the Department of Ex-Servicemen Welfare, Ministry of Defence in respect of armed forces.
    - Ministry of Home Affairs is the implementing agency for the personnel of Para Military Forces and State Police Force.
    - Ministry of Railways is the implementing agency for the personnel of Railway Protection force.

Q.94) At present which of the following country is known to possess Inter-continental Ballistic Missile?

1. Israel
2. India
3. UK
4. North Korea
5. China

Select the correct code from above

a) 1, 2 and 3 only
b) 2, 3, 4 and 5 only
c) 1, 2, 3 and 5
d) All of the above

Q.94) Solution (d)

Explanation:

Ballistic missiles are powered by rockets initially but then they follow an unpowered, free-falling trajectory toward their targets. They are classified by the maximum distance that they can travel, which is a function of how powerful the missile's engines (rockets) are and the weight of the missile's payload. To add more distance to a missile's range, rockets are stacked on top of each other in a configuration referred to as staging. There are four general classifications of ballistic missiles:

- Short-range ballistic missiles, traveling less than 1,000 kilometers (approximately 620 miles);
- Medium-range ballistic missiles, traveling between 1,000–3,000 kilometers (approximately 620-1,860 miles);
- Intermediate-range ballistic missiles, traveling between 3,000–5,500 kilometers (approximately 1,860-3,410 miles); and
- Intercontinental ballistic missiles (ICBMs), traveling more than 5,500 kilometers.
- **USA, Russia, India (Agni V), China, France, UK, Israel and North Korea (in 2017) is known to have possessing ICBMs.**

Q.95) The term 'juice jacking' has been in news, what is it?

a) type of cyber attack
b) a diseases in fruits
c) experiment relating to quantum communication
d) none of the above

Q.95) Solution (a)

Explanation:

Juice jacking is a type of cyber-attack involving a charging port that doubles as a data connection, typically over USB. This often involves either installing malware or surreptitiously copying sensitive data from a smart phone, tablet, or other computer device.

- It is a hardware-focused Man in the Middle (MitM) attack. The attacker uses a USB connection to load malware directly onto the charging station or infect a connection

cable and leave it plugged in, hoping some unsuspecting person will come along and use the 'forgotten' cable.

- USB ports and phone charging cables are the most common devices used in juice-jacking attacks. Other less common devices that may be used in this type of exploit include USB ports in video arcade consoles and portable battery power banks.

Q.96) The term Sycamore is associated with which of the following

a) Asteroid
b) Laser beaming innovation
c) Quantum computer
d) Nano-material

Q.96) Solution (c)

Explanation:

Sycamore is a quantum processor created by Google Inc.'s Artificial Intelligence division. It comprises 53 qubits.

- **In 2019, Sycamore completed a task in 200 seconds that Google claimed, in a Nature paper, would take a state-of-the-art supercomputer 10,000 years to finish. Thus, Google claimed to have achieved quantum supremacy.**
- Our traditional computers work on the basis of the laws of classical physics, specifically by utilising the flow of electricity.
- A quantum computer, on the other hand, seeks to exploit the laws that govern the behaviour of atoms and subatomic particles. At that tiny scale, many laws of classical physics cease to apply, and the unique laws of quantum physics come into play.
- In classical computer, Bits of information are stored as either 0 or 1. Every string of such digits (bitstrings) represents a unique character or instruction; for example, 01100001 represents the lowercase "a".
- In a quantum computer, information is stored in quantum bits, or qubits. And a qubit can be both 0 and 1 at the same time. Quantum physics involves concepts that even physicists describe as weird. Unlike classical physics, in which an object can exist in one place at one time, quantum physics looks at the probabilities of an object being at different points. Existence in multiple states is called superposition, and the relationships among these states is called entanglement.

- The higher the number of qubits, the higher the amount of information stored in them. Compared to the information stored in the same number of bits, the information in qubits rises exponentially. That is what makes a quantum computer so powerful.

Q.97) Consider the following statements about deep learning:

1. Deep learning is a machine learning technique that teaches computers to do what comes naturally to humans.
2. Deep learning is a key technology behind driverless cars, enabling them to recognize a stop sign.

Which of the statements given above is/are *incorrect*?

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

Q.97) Solution (c)

Deep learning is a **machine learning technique** that teaches computers to do what comes naturally to humans: learn by example**. Deep learning is a key technology behind driverless cars, enabling them to recognize a stop sign**, or to distinguish a pedestrian from a lamppost.

- It is the key to voice control in consumer devices like phones, tablets, TVs, and hands-free speakers. Deep learning is getting lots of attention lately and for good reason. It's achieving results that were not possible before.
- In deep learning, a computer model learns to perform classification tasks directly from images, text, or sound.
- Deep learning models can achieve state-of-the-art accuracy, sometimes exceeding human-level performance.
- Models are trained by using a large set of labeled data and neural network architectures that contain many layers.

So, both statements are correct here.

Q.98) Which of the following diseases is NOT caused by Virus?

a) Dengue
b) Tuberculosis
c) Rabies
d) Aids

Q.98) Solution (b)

Explanation:

Dengue: Dengue is a **mosquito-borne viral infection**. T**he virus responsible for causing dengue, is called dengue virus (DENV)**. There are four DENV serotypes, meaning that it is possible to be infected four times.

- Severe dengue is a leading cause of serious illness and death in some Asian and Latin American countries. It requires management by medical professionals.
- There is no specific treatment for dengue/severe dengue.
- Early detection of disease progression associated with severe dengue, and access to proper medical care lowers fatality rates of severe dengue to below 1%.Dengue is found in tropical and sub-tropical climates worldwide, mostly in urban and semi-urban areas.

Tuberculosis: Tuberculosis (TB) is caused by bacteria (Mycobacterium tuberculosis) that most often affect the lungs. Tuberculosis is curable and preventable. TB is spread from person to person through the air. When people with lung TB cough, sneeze or spit, they propel the TB germs into the air. A person needs to inhale only a few of these germs to become infected. About one-quarter of the world's population has a TB infection, which means people have been infected by TB bacteria but are not (yet) ill with the disease and cannot transmit it.

Rabies: Rabies is a vaccine-preventable, zoonotic, viral disease. Once clinical symptoms appear, rabies is virtually 100% fatal. In up to 99% of cases, domestic dogs are responsible for rabies virus transmission to humans. Yet, rabies can affect both domestic and wild animals. It is spread to people and animals through bites or scratches, usually via saliva.

Aids: The human immunodeficiency virus (HIV) targets the immune system and weakens people's defense against many infections and some types of cancer. As the virus destroys and impairs the function of immune cells, infected individuals gradually become immunodeficient. Immune function is typically measured by CD4 cell count.

- Immunodeficiency results in increased susceptibility to a wide range of infections, cancers and other diseases that people with healthy immune systems can fight off.

- The most advanced stage of HIV infection is acquired immunodeficiency syndrome (AIDS), which can take many years to develop if not treated, depending on the individual.
- AIDS is defined by the development of certain cancers, infections or other severe long term clinical manifestations.

Q.99) In the context of Non-Nuclear aggression agreement, consider the following statements:

1. It is agreement between India and china.
2. It prohibits attack on nuclear installation and facilities.

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.99) Solution (b)

Explanation:

The **Non-nuclear aggression agreement is a bilateral and nuclear weapons control treaty between the two South Asian states, India and Pakistan**, on the reduction (or limitation) of nuclear arms and pledged not to attack or assist foreign powers to attack on each's nuclear installations and facilities. (**So, statement 1 is incorrect.)**

- The treaty was drafted in 1988, and signed by the Prime Minister Benazir Bhutto and her Indian counterpart, Rajiv Gandhi on 21 December 1988; it entered into force on January 1991.
- **The treaty barred its signatories to carry out a surprise attack (or to assist foreign power to attack) on each other's nuclear installations and facilities. (So, statement 2 is correct)**
- Starting in January 1992, India and Pakistan have annually exchanged lists of their respective military and civilian nuclear-related facilities.

Q.100) Which of the following are correct with reference to Regional Raw drug repository (RRDR):

1. It has been launched by Ministry of Chemical and fertilizers.
2. Raw Drug Repositories are facilities that house natural resources used in the Indian System of Medicine, in the form of herbarium and raw drug samples.
3. RRDR would be involved in the collection, documentation and authentication of raw drugs gathered largely from the respective agro-climatic region.

Which of the above statements are correct?

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

Q.100) Solution (c)

Statement analysis:

Raw Drug Repositories are facilities that house natural resources used in the Indian System of Medicine, in the form of herbarium and raw drug samples. It also helps authenticate the identity of medicinal plants. (So, Statement 2 is correct.)

- RRDRs are important components of the Centrally Sponsored Scheme of National AYUSH Mission, which plays an important role in medicinal plants cultivation.
- As a step in this direction**, Ministry of AYUSH,** through the National Medicinal Plants Board, initiated establishment of National Raw Drug Repository and Regional Raw Drug Repositories. (**So, statement 1 is incorrect because RRDR is under Ministry of Aayush)**
- **This RRDR would play a stellar role in collection, documentation, and authentication of raw drugs collected from the agro-climatic region**, that is, the Southern Plateau Region. (**So, statement is correct here)**
- There is a global resurgence in the traditional and alternative health care system.
- We in India are fortunate to have systems of medicine which date back to more than 3000 years and have deep rooted societal acceptance. Ayurveda, Siddha, Unani and systems of medicine are accessible to large segment of our population including those living in remote and interior areas.

- Medicinal Plants form the major resource base of our indigenous health care traditions. Their relevance has grown substantially in the current pandemic scenario, thanks to their disease preventive effects.
- The outreach and acceptability of AYUSH systems, both nationally as well as globally, are dependent on uninterrupted availability of quality medicinal plants based raw material. Though most of our raw drugs are commonly available, there is a lack of scientific documentation which makes research on these medicines very difficult. This also reduces the chances of commercial exploitation of these medicines.
- Easy availability of authentic scientific date of the raw drugs will promote the research on the medicines belonging to AYUSH system which will lead to further propagation of these systems.
- The growth and acceptability of traditional systems require robust infrastructure of hospitals, dispensaries, pharmacies and manufacturing units so as to manufacture and dispense quality medicine.
- The country has more than 9000 manufacturing units for Ayurveda, Siddha, Unani and Homeopathy medicine. However, the quality of medicines produced by these units critically depend upon the manufacturing process followed as well as the quality of raw material.
- The Government has made it mandatory for all manufacturing units to adhere to the Good Manufacturing Practices as notified under Schedule T of the Drugs and Cosmetics Act 1940. However, since more than 90% of the formulations under these systems of medicine are plant based, what is critical is to ensure sustained availability of quality raw material.