NDA-II Science Questions with Solutions

Q1. The solution of which one of the following will have pH less than 7?
(a) NaOH
(b) KCI
(c) $FeCl_3$
(d) NaCl

Q2. Which one of the following is an oxidation-reduction reaction?
(a) $NaOH + HCl \rightarrow NaCl + H_2O$
(b) $CaO + H_2O \rightarrow Ca(OH)_2$
(c) $2Mg + O_2 \rightarrow 2MgO$
(d) $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$

Q3. Which one of the following is not used as fertilizer?
(a) Ammonium nitrate
(b) Ammonium sulphide
(c) Ammonium phosphate
(d) Ammonium sulphate

Q4. Which one of the following is the chemical formula of gypsum?
(a) $CaSO_4. 2H_2O$
(b) $Ca_2 SiO_4$
(c) $2CaSO_4. H_2O$
(d) $CaSO_4$

Q5. Which one of the following statements about the law of conservation of mass is correct?
(a) A given compound always contains exactly same proportion of elements.
(b) When gases combine in a reaction, they do so in a simple ratio by volume, provided all gases are at room temperature.
(c) Matter can neither be created nor destroyed.
 temperature and pressure contain equal number of molecules.
(d) Equal volume of all gases at same

Q6. The wavelength of X-ray is of the order of
(a) 1 Å
(b) 2 μm
(c) 1 mn
(d) 1 cm

Q7. Consider the following velocity and time graph:
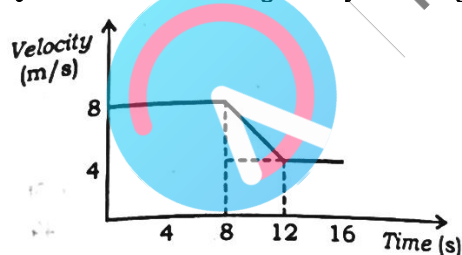
Which one of the following is the value of average acceleration from 8 s to 12 s?
(a) $8 \, m/s^2$
(b) $12 \, m/s^2$
(c) $2 \, m/s^2$
(d) $-1 \, m/s^2$

Q8. If the focal length of a convex lens is 50 cm, which one of the following is its power?
(a) +2 diopter
(b) +0.02 diopter

(c) –0.5 diopter
(d) +0.5 diopter

Q9. Which one of the following is called dry ice?
   (a) Solid carbon dioxide
   (b) Liquid carbon dioxide
   (c) Liquid nitrogen
   (d) Liquid ammonia

Q10. The acidic semi digested food coming out of the stomach is neutralized by
   (a) Pancreatic juice
   (b) Duodenal secretion
   (c) Large intestine secretion
   (d) Bile juice

Q11. The oxygenated blood from the lungs is received by the
   (a) Left auricle
   (b) Left ventricle
   (c) Right auricle
   (d) Right ventricle

Q12. The oxygen evolved during photosynthesis comes from splitting of
   (a) Water
   (b) Carbon dioxide
   (c) Oxygen
   (d) Light

Q13. Which one of the following depicts the correct circuit of a reflex arc?
   (a) Effector-sensory neuron-spinal cord-motor neuron-receptor
   (b) Receptor-sensory neuron-effector cord-motor neuron-effector
   (c) Receptor-sensory neuron- brain-motor neuron-effector
   (d) Sensory neuron-receptor-brain-effector-motor neuron

Q14. If one set of chromosomes for a given plant is represented as N; in case of double fertilization, the zygote and the endosperm nucleus of a diploid plant would have how many sets of chromosomes respectively?
   (a) N and 2N
   (b) 2N and 3N
   (c) N and 3N
   (d) 2N and 3N

Q15. Consider the following circuit:
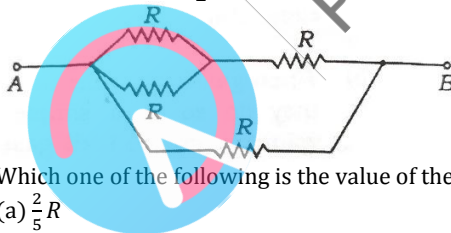
   Which one of the following is the value of the resistance between points A and B in the circuit given above?
   (a) $\frac{2}{5}R$
   (b) $\frac{3}{5}R$
   (c) $\frac{3}{2}R$
   (d) 4R

Q16. The absolute zero temperature is 0 Kelvin. In °C unit, which one of the following is the absolute zero temperature?
   (a) 0 °C
   (b) –100 °C
   (c) –273.15 °C
   (d) –173.15 °C

Q17. Consider the following statements about visible light, UV light and X-rays:

1. The wavelength of visible light is more than that of X-rays.
2. The energy of X-ray photons is higher than that of UV light photons.
3. The energy of UV light photons is less than that of visible light photons.
Which of the statements given above is/are correct?
(a) 1, 2 and 3
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1 only

Q18. The time period of oscillation of a simple pendulum having length L and mass of the bob m is given as T. If the length of the pendulum is increased to 4L and the mass of the job is increased to 2m, then which one of the following is the new time period of oscillation?
(a) T
(b) 2T
(c) 4T
(d) T/2

Q19. The connecting cable of electrical appliances like electric iron, water heater or room heater contains three insulated copper wires of three different colours-red, green and black. Which one of the following is the correct colour code?
(a) Red-live wire, Green-neutral wire, Black-ground wire
(b) Red-neutral wire, Green-ground wire, Black-live wire
(c) Red-live wire, Green-ground wire, Black-neutral wire
(d) Red-ground wire, Green-live wire, Black-neutral wire

Q20. The graphs between current (I) and voltage (V) for three linear resistors 1, 2 and 3 are given below:
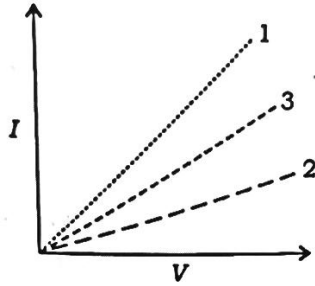
If $R_1, R_2 \ and \ R_3$ are the resistances of these resistors, then which one of the following is correct?
(a) $R_1 > R_2 > R_3$
(b) $R_1 < R_3 < R_2$
(c) $R_3 < R_1 < R_2$
(d) $R_3 > R_2 > R_1$

Q21. Consider the following statements about a microscope and a telescope:
1. Both the eyepiece and the objective of a microscope are convex lenses.
2. The focal length of the objective of a telescope is larger than the focal length of its eyepiece.
3. The magnification of a telescope increases with the increase in focal length of its objective.
4. The magnification of a microscope increases with increase in focal length of its objective.
Which of the statements given above are correct?
(a) 1 and 3 only
(b) 1 and 4
(c) 2, 3 and 4
(d) 1, 2 and 3

Q22. A planet has a mass M_1 and radius R_1. the value of acceleration due to gravity on its surface is g_1. There is another planet 2, who's mass and radius both are two times that of the first planet. Which one of the following is the acceleration due to gravity on the surface of planet 2?
(a) g_1
(b) $2g_1$
(c) $g_1/2$
(d) $g_1/4$

Q23. Which one of the following is called 'syngas'?

(a) $C(s) + H_2O(g)$
(b) $CO(g) + H_2O(g)$
(c) $CO(g) + H_2(g)$
(d) $NO_2(g) + H_2(g)$

Q24. The frequency of ultrasound waves is
(a) Less than 20 Hz
(b) Between 20 Hz and 2 kHz
(c) Between 2 kHz and 20 kHz
(d) Greater than 20 kHz

Q25. The magnetic field strength of a current-carrying wire at a particular distance from the axis of the wire
(a) Depends upon the current in the wire
(b) Depends upon the radius of the wire
(c) Depends upon the temperature of the surroundings
(d) None of the above

Q26. A stainless steel chamber contains Ar gas at a temperature T and pressure P. The total number of Ar atoms in the chamber is n. Now Ar gas in the chamber is replaced by CO_2 gas and the total number of CO_2 molecules in the chamber is n/2 at the same temperature T. The pressure in the chamber now is P'. Which one of the following relations holds true? (Both the gases behave as ideal gases)
(a) P' = P
(b) P' = 2P
(c) P' = P/2
(d) P' = P/4

Q27. Which one of the following is the correct relation between Å and nm?
(a) $1 \text{ nm} = 10^{-1}$Å
(b) $1 \ nm = 10$ Å
(c) $1 \ nm = 1$ Å
(d) $1 \ nm = 10^{-2}$Å

Q28. The full form of LED is
(a) Light Emitting Diode
(b) Light Emitting Device
(c) Light Emitting Device
(d) Light Enhancing Diode

Q29. If a free electron moves through a potential difference of 1 kV, then the energy gained by the electron is given by
(a) $1.6 \times 10^{-19} J$
(b) $1.6 \times 10^{-16} J$
(c) $1 \times 10^{-19} J$
(d) $1 \times 10^{-16} J$

Q30. Which one of the following statements about temperature is correct?
(a) Temperature decreases with height in the stratosphere.
(b) Temperature is constant at different heights in the stratosphere.
(c) Temperature increases with height in the troposphere at an average rate of 6.5 °C per kilometer.
(d) Temperature decreases with height in the troposphere at an average rate of 6.5 °C per kilometer.

Q31. Which one of the following reactions will give NO (nitric oxide) gas a one of the products?
(a) $3Cu + 8HNO_3 \ (dilute) \rightarrow$
(b) $Cu + 4HNO_3 \ (conc.) \rightarrow$
(c) $4Zn + 10HNO_3 \ (dilute) \rightarrow$
(d) $Zn + 4HNO_3 \ (conc.) \rightarrow$

Q32. Which one of the following is a tribasic acid?
(a) Hydrochloric acid
(b) Nitric acid
(c) Sulphuric acid

(d) Phosphoric acid

Q33. Which one of the following statements is not correct?
(a) All carbons in diamond are linked by carbon-carbon single bond.
(b) Graphite is layered structure in which layers are held together by weak van der Waals forces.
(c) Graphite layers are formed by hexagonal rings of carbon atoms.
(d) Graphite layers are held together by carbon-carbon single bond.

Directions:
The following three (3) items consists of two statements, Statements I and Statement II. Examine these two statements carefully and select the correct answer using the code given below.
Code:
(a) Both the statements are individually true and Statement II is the correct explanation of Statement I
(b) Both the statements are individually true but Statement II is not the correct explanation of Statement I
(c) Statement I is true but Statement II is false
(d) Statement I is false but Statement II is true

Q34. Statement I:
The pitch of the sound wave depends upon its frequency.
Statement II:
The loudness of the sound wave depends upon its amplitude.

Q35. Statement I:
Sound wave cannot propagate in vacuum.
Statement II:
Sound waves are elastic waves and require a medium to propagate.

Q36. Statement I:
Phytoplankton produces most of the organic carbon in the ocean.
Statement II:
Algae are produced in the cold water biome.

Q37. Which one of the following groups of cellular organelles contains DNA?
(a) Mitochondria, nucleus, chloroplast
(b) Mitochondria, Golgi bodies, nucleus
(c) Mitochondria, plasma membrane, nucleus
(d) Chloroplast, nucleus, ribosomes

Q38. One of the additional functions of Smooth Endoplasmic Reticulum (SER) is
(a) Protein synthesis
(b) Lipid synthesis
(c) Storage of biomolecules
(d) Detoxification of toxic substances

Q39. Damage to the apical meristem of a growing young plant will affect the
(a) Length of the plant
(b) Colour of the flower
(c) Colour of the leaves
(d) Taste of the fruits

Q40. Which of the following kingdoms has/have only unicellular organisms?
(a) Monera only
(b) Protista only
(c) Monera and Protista both
(d) Protista and Fungi both

Q41. Which one of the following is a waterborne disease?
(a) Jaundice
(b) Tuberculosis
(c) Rabies
(d) Arthritis

Q42. The atomic number of an element is 8. How many electrons will it gain to form a compound with sodium?

(a) One
(b) Two
(c) Three
(d) Four

Q43. A sample of oxygen contains two isotopes of oxygen with masses 16 u and 18 u respectively. The proportion of these isotopes in the sample is 3 : 1. What will be the average atomic mass of oxygen in this sample?
(a) 17.5 u
(b) 17 u
(c) 16 u
(d) 16.5 u

Q44. Which one of the following is a heterogeneous mixture?
(a) Hydrochloric acid
(b) Vinegar
(c) Milk
(d) Soda water

Q45. What is the molar mass of anhydrous sodium carbonate? (Given that the atomic masses of sodium, carbon and oxygen are 23 u, 12 u and 16 u respectively)
(a) 286 u
(b) 106 u
(c) 83 u
(d) 53 u

Q46. A ball is released from rest and rolls down an inclined plane, as shown in the following figure, requiring 4s to cover a distance of 100 cm along the plane:
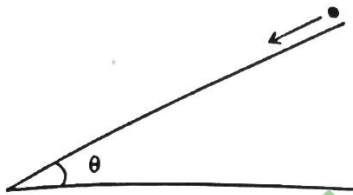
Which one of the following is the correct value of angle θ that the plane makes with the horizontal? (g = 1000 cm/s^2)
(a) $\theta = \sin^{-1}(1/9.8)$
(b) $\theta = \sin^{-1}(1/20)$
(c) $\theta = \sin^{-1}(1/80)$
(d) $\theta = \sin^{-1}(1/100)$

Q47. The coefficient of area expansion of a material is $1.6 \times 10^{-5} K^{-1}$. which one of the following gives the value of coefficient of volume expansion of this material?
(a) $0.8 \times 10^{-5} K^{-1}$
(b) $2.4 \times 10^{-5} K^{-1}$
(c) $3.2 \times 10^{-5} K^{-1}$
(d) $4.8 \times 10^{-5} K^{-1}$

Q48. The refractive indices of two media are denoted by n_1 and n_2, and the velocities of light in these two media are respectively v_1 and v_2. If n_2/n_1 is 1.5, which one of the following statements is correct?
(a) v_1 is 1.5 times v_2.
(b) v_2 is 1.5 times v_1.
(c) v_1 is equal to v_2.
(d) v_1 is 3 times v_2.

Q49. Which one of the following greenhouse gases is in largest concentration in the atmosphere?
(a) Chlorofluorocarbon
(b) Nitrous oxide
(c) Carbon dioxide
(d) Methane

Q50. Which one of the following is not a process of chemical weathering?
(a) Solution
(b) Carbonation
(c) Oxidation
(d) Exfoliation

Q51. Which one of the following statement is correct for a plane mirror?
(a) Its focal length is zero.
(b) The size of the image of an object placed in front of the mirror is slightly less than that of the object.
(c) The image is virtual, erect and laterally inverted.
(d) Its focal length is 200 cm.

Q52. An object is placed in front of a convex mirror. Which one of the following statements is correct?
(a) It will never form an inverted image.
(b) The image moves towards the focus when the object moves towards the mirror.
(c) Depending on the position of the object with respect to the mirror, the image can be inverted and real.
(d) The size of the image becomes larger than that of the object when the object is placed at a distance equal to half the focal length.

Q53. A circular coil of radius R having N number of turns carries a steady current I. The magnetic induction at the centre of the coil is 0.1 tesla. If the number of turns is doubled and the radius is halved, which one of the following will be the correct value for the magnetic induction at the centre of the coil?
(a) 0.05 tesla
(b) 0.2 tesla
(c) 0.4 tesla
(d) 0.8 tesla

Q54. Permanent hardness of water cannot be removed by which one of the following methods?
(a) Treatment with washing soda
(b) Calgon's method
(c) Boiling
(d) Ion exchange method

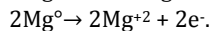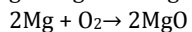**SOLUTIONS**

S1. Ans. (c)
Sol. $FeCl_3$ is an acidic salt that is able to produce protons (H+) in aqueous solution through hydrolysis. Fe_3 + ion acts as a Lewis acid in water. So $FeCl_3$ having pH less than 7.

S2.Ans. (c)
Sol. An oxidation-reduction (redox) reaction is a type of chemical reaction that involves a transfer of electrons between two species. An oxidation-reduction reaction is any chemical reaction in which the oxidation number of a molecule, atom, or ion changes by gaining or losing an electron.
$2Mg + O_2 \rightarrow 2MgO$
$2Mg^{\circ} \rightarrow 2Mg^{+2} + 2e^-$.

S3.Ans.(b)
Sol. Ammonium sulfide solutions are used occasionally in photographic developing, to apply patina to bronze, and in textile manufacturing. Also, due to its offensive smell, it is the active ingredient in a variety of pranks including the common stink bomb.

S4.Ans.(a)
Sol. Gypsum is a soft sulfate mineral composed of calcium sulfate dihydrate, with the chemical formula $CaSO. 2H_2O$. It is widely mined and is used as a fertilizer, and as the main constituent in many forms of plaster, blackboard chalk and wallboard.

S5.Ans.(c)
Sol. The Law of Conservation of Mass dates from Antoine Lavoisier's 1789 discovery that mass is neither created nor destroyed in chemical reactions. In other words, the mass of any one element at the beginning of a reaction will equal the mass of that element at the end of the reaction.

S6.Ans.(a)
Sol. X-ray is a electromagnetic radiation of extremely short wavelength and high frequency, with wavelengths ranging from about 0.1 nanometer to 10 nanometer and corresponding frequencies from about 10^{16} to 10^{20} hertz (Hz).

S7.Ans.(d)
Sol. *Average Acceleration*,
$a = \frac{\Delta v}{\Delta t} = \frac{4-8}{12-8} = -1 m/s^2.$

S8.Ans.(a)
Sol. $Power = \frac{100}{Focal\ length\ in\ cm}\ diopter$

$$= \frac{100}{50} = +2\ diopter$$

S9.Ans.(a)
Sol. Dry Ice is the common name for solid carbon dioxide (CO_2). It gets this name because it does not melt into a liquid when heated.

S10.Ans.(a)
Sol. Pancreatic juice is alkaline in nature because of a high concentration of bicarbonate ions; this helps to neutralize the acidic gastric juice from the stomach. Secretion of pancreatic juice is stimulated by hormones of the duodenum, such as secretin and cholecystokinin, and by nervous impulses through the vagus nerve.

S11.Ans.(a)
Sol. The left atrium (or auricle) receives the oxygenated blood from the left and right pulmonary veins, which it pumps to the left ventricle (through the mitral valve) for pumping out through the aorta for systemic circulation.

S12.Ans.(a)
Sol. Due to photolysis of water oxygen is released during photosynthesis. t is the process of breakdown of water molecule into hydrogen and oxygen under the influence of light during the light reaction of photosynthesis.

S13.Ans.(b)
Sol. The reflex arc is a special type of neural circuit that begins with a sensory neuron at a receptor (e.g., a pain receptor in the fingertip) and ends with a motor neuron at an effector (e.g., a skeletal muscle).

S14.Ans.(d)

S15.Ans.(b)
Sol. $R_{AB} = ?$

$\Rightarrow \frac{1}{R_1} = \frac{1}{R} + \frac{1}{R} = \frac{2}{R}$
$R_1 = \frac{R}{2}$
Now R_1 and R in series
$R_1 = R_1 + R$
$= \frac{R}{2} + R \Rightarrow \frac{3}{2}R$
Now
$\frac{1}{R_{AB}} = \frac{1}{R_2} + R$
$= \frac{2}{3}R + R$
$= \frac{5R}{3}$
$R_{AB} = \frac{3}{5}R$

S16.Ans.(c)
Sol. Absolute zero, temperature at which a thermodynamic system has the lowest energy. It corresponds to −273.15 °C on the Celsius temperature scale and to −459.67 °F on the Fahrenheit temperature scale.

S17.Ans.(b)
Sol. The energy of UV light photons is higher than that of visible light photons.

S18.Ans. (b)
Sol. Time period$= 2\pi\sqrt{\frac{l}{g}}$

New time Period$\frac{T_2}{T_1} = \sqrt{\frac{L_2}{L_1}}$

$T_2 = T\sqrt{\frac{4L}{L}}$

$\boldsymbol{T_2 = 2T}$

S19.Ans.(c)

S20.Ans.(b)
Sol. According to the Ohm's law current I is inversely proportional to the resistance R, so when current increase the resistance is decrease. Now correct sequence is $R_2 > R_3 > R_1$.

S21.Ans.(d)
Sol. If the focal length of the objective lens is increased than magnifying power of microscope will decrease and but that of telescope will increase.

S22.Ans.(c)
Sol. Acceleration due to gravity , $g = \frac{GM}{R^2}$

g = acceleration due to gravity (units m/s^2)
G = the universal gravitational constant, G = 6.673 x 10^{-11}N·m^{2}kg^{-2}.
m = mass of a large body (for example, Earth)
r = the distance from the center of mass of the large body
$M_1 = M$ $\qquad M_2 = 2M$
$R_1 = R$ $\qquad\qquad\quad R_2 = 2R$
$\frac{g_2}{g_1} = \frac{\left(\frac{GM}{R^2}\right)_2}{\left(\frac{GM}{R}\right)_1} \Rightarrow \frac{GM_2}{R_2^2} \times \frac{R_1^2}{M_1}$
$\frac{g_2}{g_1} = \frac{2M}{(2R)^2} \times \frac{R}{M}$
$\boldsymbol{g_2 = \frac{g_1}{2}}$

S23.Ans.(c)
Sol. Syngas is an abbreviation for synthesis gas, which is a mixture comprising of carbon monoxide, carbon dioxide, and hydrogen. The syngas is produced by gasification of a carbon containing fuel to a gaseous product that has some heating value.

S24.Ans.(d)
Sol. The range of human hearing is about 20 Hz to 20,000 Hz. Ultrasound waves have frequencies above about 20,000 Hz (which is 20 kHz). As this is above the normal hearing range for humans, we cannot hear ultrasound.

S25.Ans.(a)
Sol. Ampère's Law states that a current (i) in a wire induces a magnetic field (B) around the wire proportional to that current.

S26.Ans.(c)
Sol. The pressure increase is caused by the number of particles hitting against the walls of the container. So if number of molecule decrease than the pressure is also decrease.

S27.Ans.(b)

S28. Ans.(a)
Sol. LED's full form is Light Emitting Diode means the screen of LED is made up of millions of diode fabricated electronically to create a screen for visualization.

S29.Ans.(b)
Sol. Potential Energy, PE = q × ΔV= 1.6 × 10⁻¹ × 1000

PE = $1.6 × 10^{-16}$ J

S30.Ans.(d)
Sol. lapse rate is positive or negative when temperature decreases or increases with height. The actual change
of temperature reduction with height for a static atmosphere. The universal atmospheric standard for a normal lapse rate is
6.5℃/km.

S31.Ans.(a)

S32.Ans.(d)
Sol. A tribasic acid is an acid that has three hydrogen ions to donate to a base in an acid-base reaction. Therefore, a tribasic molecule
has three replaceable hydrogen atoms; Phosphoric acid and citric acid are examples of tribasic acids.

S33.Ans.(d)
Sol. Carbon forms a double covalent bond, which means that two pairs of bonding electrons are shared. The bonds between atoms of
carbon in the layers of graphite may be strong, but the bonds that are formed by carbon atoms between layers are quite weak. These
atoms are held together by Van Der Waal's forces.

S34.Ans.(b)
Sol. The pitch and loudness of sound depends upon the frequency and amplitude respectively. Both are individually correct but
statement II is not the correct explanation of statement I.

S35.Ans.(a)
Sol. Sound cannot travel through a vacuum. A vacuum is an area without any air, like space. So sound cannot travel through space
because there is no matter for the vibrations to work in.
So statement II is the correct explanation of statement I.

S36.Ans.(b)
Sol. Algae are organisms that grow in aquatic environments and use light and carbon dioxide (CO2) to create biomass. There are two
classifications of algae: macroalgae and microalgae. Macroalgae, which are measured in inches, are the large, multi-cellular algae
often seen growing in ponds.

S37.Ans.(a)
Sol. The three organelles that contain DNA are the nucleus, mitochondria and chloroplasts. The nucleus is the control center of the
cell, and houses genetic information. The mitochondria and chloroplasts both produce energy, in animal and plant cells, respectively.

S38.Ans.(d)
Sol. Its main functions are the synthesis of lipids, steroid hormones, the detoxification of harmful metabolic byproducts and the
storage and metabolism of calcium ions within the cell. The smooth ER is distinguished from the other parts of the endoplasmic
reticulum by the absence of membrane-bound ribosomes.

S39.Ans.(a)
Sol. Apical meristem causes primary growth, the growth resulting plant to get longer. So, if apical meristem is either damaged or cut,
the process of growth would no longer take place and the plant will stop growing in length.

S40.Ans.(c)
Sol. Monera are unicellular organism's having prokaryotic cellular structure. Protista are also unicellular organisms though possess
eukaryotic cellular organisation. Well defined as well membrane-bounded cellular organelles are present. Monera are simple in
structure, with no complexity.

S41.Ans.(a)
Sol. Jaundice is a yellow discoloration of the skin, mucous membranes, and the whites of the eyes caused by increased amounts of
bilirubin in the blood. Jaundice is a sign of an underlying disease process. Normally, the liver metabolizes and excretes the bilirubin in
the form of bile

S42.Ans.(b)
Sol. O has 6 electrons in its outermost orbit and is short of two electrons to obtain octate configuration. So, in Na2O each sodium atom releases 1 electron and those two electrons are catched by 1 oxygen atom and thus forming Na2O. Sodium oxide is a chemical compound with the formula Na_2O.

S43.Ans.(d)
Sol.
$\Rightarrow$ First Isotopes $\rightarrow$ 16u
Second Isotopes $\rightarrow$ 18u
Proportion of Isotopes = 3 : 1
Now, Average atomic Oxygen = $\frac{16u \times 3 + 18u \times 1}{3+1}$
$= \frac{48u + 18u}{4}$
$= \frac{66u}{4}$
= 16.5u

S44.Ans.(c)
Sol. Milk is an example of a heterogeneous mixture. Mixtures can be separated into two or more individual substances by physical means. Our glass of ice water is a mixture because we can easily separate the ice from the liquid water by filtration.

S45. Ans.(b)
Sol. Molar mass

Given $\rightarrow$

Na = 23
C = 12
O = 16
Molar mass of Anhydrous
Sodium Carbonate $\rightarrow Na_2CO_3$
$\Rightarrow 2 \times Na + C + 3 \times O$
$\Rightarrow 2 \times 23 + 12 + 3 \times 16$
$\Rightarrow 46 + 12 + 48$
$\Rightarrow 106$

S46.Ans.(c)
Sol.
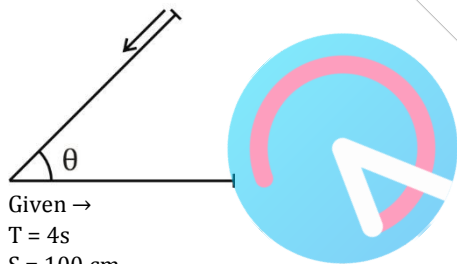
Given $\rightarrow$
T = 4s
S = 100 cm
G = 1000 cm/s^2
Now,
$S = ut + \frac{1}{2}gt^2$
$S = \frac{1}{2}at^2$
$a = \frac{2S}{t^2} = \frac{2 \times 100}{4^2} = \frac{200}{16} = 12.5$ cm^2/S
Now acceleration, a = g sin θ
$\Rightarrow \sin\theta = \frac{a}{g} = \frac{12.5}{10000} = \frac{1}{80}$
$\theta = \sin^{-1}\left(\frac{1}{80}\right)$

S47.Ans.(b)
Sol. Coefficient of area Expansion, $\beta = 1.6 \times 10^{-5}$ K^{-1}

Now

Coefficient of volume Expansion
$y = \frac{3}{2} \times \beta$
$\Rightarrow \frac{3}{2} \times 1.6 \times 10^{-5}$K^{-1}
$\Rightarrow 2.4 \times 10^{-5}$K^{-1}

S48.Ans.(a)
Sol. Refractive Index $\rightarrow \frac{\text{Speed of light in air}}{\text{Speed of light in medium}}$

$n = \frac{c}{v}$
Now $n \propto \frac{1}{v}$
$\Rightarrow \frac{n_1}{n_1} = \frac{v_1}{v_2} \Rightarrow 1.5 = \frac{v_1}{v_2}$
Or $v_1 = 1.5 \, v_2$

S49.Ans.(c)
Sol. The presence of four major greenhouse gases, namely water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) in the Earth's atmosphere keeps the average temperature of 15º C (59º F), whereas without the greenhouse effect the average temperature would be a frosty -18º C (0º F).

S50.Ans.(d)
Sol. Exfoliation involves the removal of the oldest dead skin cells on the skin's outermost surface. Exfoliation is involved in all facials, during microdermabrasion or chemical peels. Exfoliation can be achieved by mechanical or chemical means.

S51.Ans.(c)
Sol. A virtual image is a copy of an object formed at the location from which the light rays appear to come. Plane mirrors are the only type of mirror for which a real object always produces an image that is virtual, erect and of the same size as the object.

S52.Ans.(a)
Sol. An image in which up and down, as well as left and right, are interchanged; that is, an image that results from rotating the object 180° about a line from the object to the observer; such images are formed by most astronomical telescopes.

S53.Ans. (c)
Sol. Magnetic Induction $B_1 = 0.1$ tesla

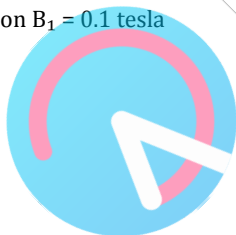$\beta = \frac{Mon\,I}{2a}$
where
n = No. of turns
a = Radius
I = current
$\beta \propto \frac{n}{a}$
$\Rightarrow \frac{\beta_2}{\beta_1} = \frac{n_2}{a_2} \times \frac{a_1}{n_1}$
$\Rightarrow \frac{2 \times h}{\frac{a}{2}} \times \frac{a}{h} = 4$
$\beta_2 = 4 \times 0.1$
$\beta_2 \Rightarrow 0.4$ tesla

S54.Ans.(c)
Sol. Permanent hardness in water is hardness due to the presence of the chlorides, nitrates and sulphates of calcium and magnesium, which will not be precipitated by boiling. The lime scale can build up on the inside of the pipe restricting the flow of water or causing a blockage.