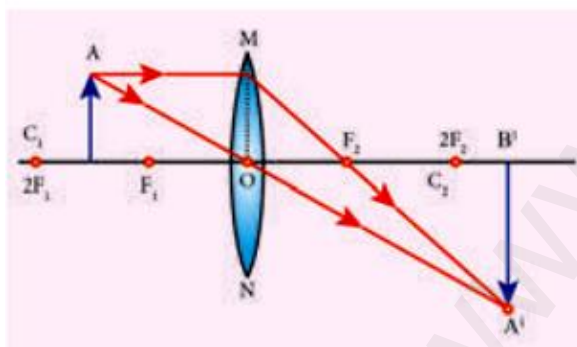


Part - I

1. One kilogram force equals to c) 98×10^4 dyne
2. In the Given diagram, the possible direction of heat energy transformation is a) $A \leftarrow B, A \leftarrow C, B \leftarrow C$
3. Velocity of sound in the atmosphere of a planet is 500 ms^{-1} . The minimum distance between the sources of sound and the obstacle to hear the echo, should be c) 25m
4. Which of the following statements is incorrect? c. One mole of hydrogen gas contains Avogadro's number of atoms.
5. Which of the following is the universal solvent? c) water
6. Rectified spirit is an aqueous solution which contains about _____ of ethanol a) 95.5%
7. Pharyngeal ganglion in leech is a part of b) nervous system
8. In reflex action, the reflex arc is formed by d) receptor, spinal cord, muscle
9. Anemophilous flowers have d) Large feathery stigma
10. The term Ethnobotany was coined by b) J.W. Harshberger
11. Coronary heart disease is due to d) Insufficient blood supply to heart muscles
12. Which is used to build scripts? a) script area

PART II

13.

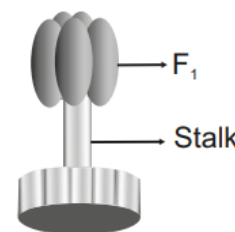


14. Ceiling of concert halls are curved to focus the sound at the audience. Concert halls are designed with parabolic reflecting surfaces. In elliptical surfaces, sound from one focus will always be reflected to the other focus. This improves the quality of the sound.

15. a) Soddy Fajan - Displacement law
 b. Irene Curie - Artificial Radioactivity
 c. Henry Bequerel - Natural radioactivity
 d. Albert Einstein - Mass energy equivalence

16. (i) ionic (ii) bauxite
17. When ionic salts are dissolved in water to make their saturated aqueous solution, their ions attract water molecules which are attached chemically in a certain ratio. These ionic substances crystallize out from their saturated aqueous solution with a definite number of molecules of water. Such salts are called hydrated salts.

18. Oxysomes:



19. The valves are the muscular flaps that regulate the flow of blood in a single direction and prevent back flow of blood.
20. Triiodothyronine (T3) and Tetraiodothyronine or Thyroxine (T4) require iodine for their formation. Deficiency of iodine in diet leads to the enlargement of thyroid gland which protrudes as a marked swelling in the neck and is called as goitre.
21. Script editor / costume editor - edit programs or the sprite's pictures.
 - a. Script area (build scripts),
 - b. Block menu (choose the category of blocks (programming statements),
 - c. Block palette (choose the block to use).

22. Given:

Velocity, $V = 1400 \text{ m/s}$
 Time interval, $T = 1.6 \text{ seconds}$
 Depth of the sea, $d = ?$

Formula:

Velocity, $V = \frac{2 \times \text{Distance } (d)}{\text{Timetaken } (t)}$

Substitution:

$$\text{Depth or distance, } d = \frac{vt}{2} = \frac{1400 \times 1.6}{2}$$

Result:

Depth of the sea, d = 1120 m

Part III

23. Universal law of gravitation:

Every particle of matter in this universe attracts every other particle with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between the centers of these masses. The direction of the force acts along the line joining the masses.

This force is attractive and it does not depend on the medium.

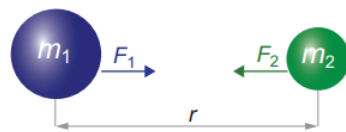
Let, m_1 and m_2 be the masses of two bodies A and B placed r metre apart.

Force $F \propto m_1 \times m_2$

$$F \propto 1/r^2$$

On combining the above two expressions

$$F \propto \frac{m_1 \times m_2}{r^2} = \frac{G m_1 m_2}{r^2}$$



where G is the universal

gravitational constant.

$$G = 6.674 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}.$$

24. (i) One roentgen is the quantity of radioactive substance which produces a charge of 2.58×10^{-4} coulomb in 1 kg of air under standard conditions of pressure, temperature and humidity.

ii) Soddy and Fajan's displacement law:

When a radioactive element emits an alpha particle, a daughter nucleus is formed whose mass number is less by 4 units and the atomic number is less by 2 units, than the mass number and atomic number of the parent nucleus.

When a radioactive element emits a beta particle, a daughter nucleus is formed whose mass number is the same and the atomic number is more by 1 unit, than the atomic number of the parent nucleus.

25. Properties of light: (any four)

1. Light is a form of energy.
2. Light always travels along a straight line.
3. Light does not need any medium for its propagation. It can even travel through vacuum.
4. The speed of light in vacuum or air is, $c = 3 \times 10^8 \text{ ms}^{-1}$.

5. Since, light is in the form of waves, it is characterized by a wavelength (λ) and a frequency (ν), which are related by the following equation: $c = \nu \lambda$ (c - velocity of light).

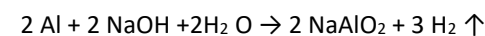
6. Different coloured light has different wavelength and frequency.

7. Among the visible light, violet light has the lowest wavelength and red light has the highest wavelength.

8. When light is incident on the interface between two media, it is partly reflected and partly refracted.

26. Modern Atomic Theory:

1. An atom is no longer indivisible (after the discovery of the electron, proton, and neutron).
 2. Atoms of the same element may have different atomic mass. (discovery of isotopes $^{35}_{17}\text{Cl}$, $^{37}_{17}\text{Cl}$).
 3. Atoms of different elements may have same atomic masses (discovery of Isobars $^{40}_{18}\text{Ar}$, $^{40}_{20}\text{Ca}$).
 4. Atoms of one element can be transmuted into atoms of other elements. Atom is no longer indestructible (discovery of artificial transmutation).
 5. Atoms don't always combine with each other in whole number ratios. (E.g. Glucose $\text{C}_6\text{H}_{12}\text{O}_6$ C:H:O = 6:12:6 or 1:2:1 and Sucrose $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ C:H:O = 12:22:11).
 6. Atom is the smallest particle that takes part in a chemical reaction.
 7. The mass of an atom can be converted into energy ($E = mc^2$).
27. a) Bauxite is naturally insoluble in natural solvents. It forms soluble sodium meta-aluminate which dissolves in caustic alkali and thus impurities can be separated.



b) Fluorspar. Fluorspar lowers the fusion temperature of electrolyte.

28. Functions of blood:

- i) Transport of respiratory gases (Oxygen and CO_2).
- ii) Transport of digested food materials.
- iii) Transport of hormones.
- iv) Transport of nitrogenous excretory products like ammonia, urea and uric acid.
- v) Protection of the body and defense against diseases.
- vi) Acts as buffer and helps in regulation of pH and body temperature.
- vii) It maintains proper water balance in the body.

29. Structure of DNA:

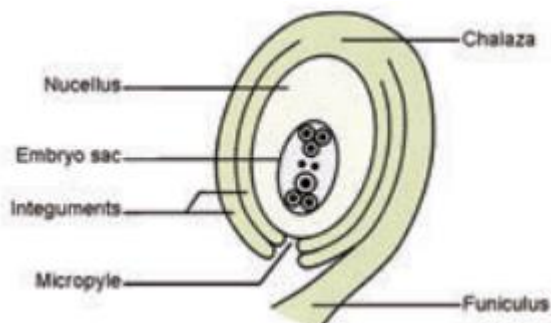
DNA consists of millions of nucleotides. Each nucleotide consists of three components. 1. A sugar molecules – Deoxyribose sugar.

2. A nitrogenous base. There are two types of nitrogenous bases in DNA.
 - (a) Purines (Adenine and Guanine)
 - (b) Pyrimidines (Cytosine and Thymine)
3. A phosphate group

Watson and Crick model

1. DNA molecule consists of two polynucleotide chains.
2. These chains form a double helix structure with two strands which run anti-parallel to one another.
3. Nitrogenous bases in the centre are linked to sugar-phosphate units which form the backbone of the DNA.
4. Pairing between the nitrogenous bases is very specific and is always between purine and pyrimidine linked by hydrogen bonds.
5. Hydrogen bonds between the nitrogenous bases make the DNA molecule stable.
6. Each turn of the double helix is 34 \AA (3.4 nm). There are ten base pairs in a complete turn.
7. The nucleotides in a helix are joined together by phosphodiester bonds.

30. Structure of ovule:



- i) The main part of the ovule is the nucellus enclosed by two integuments leaving an opening called as micropyle.
- ii) The ovule is attached to the ovary wall by funiculus.
- iii) Chalaza is the basal part.
- iv) The embryo sac contains seven cells and the eighth nuclei is located within the nucellus. Three cells at the micropylar end form the egg apparatus and the three cells at the chalaza end are the antipodal cells.
- v) The remaining two nuclei are called polar nuclei found in the centre. In the egg apparatus one is the egg cell (female gamete) and the remaining two cells are the synergids.

31.

Factors Type	Type 1 Insulin dependent diabetes mellitus (IDDM)	Type 2 Non insulin dependent diabetes mellitus (NIDDM)
Prevalence	10 - 20%	80 - 90%
Age of onset	Juvenile onset < 20 years	Maturity onset > 30 years
Body weight	Normal or underweight	Obesity, sedentary life style, overeating, physical inactivity
Defect	Insulin deficiency due to destruction of β cells	Target cells do not respond to insulin
Symptoms	abnormally elevated blood glucose levels (hyperglycemia)	Hyperglycemia, Polyuria, polydipsia, glycosuria, polyphagia, fatigue and loss of weight.
Treatment	Insulin administration is necessary	Can be controlled by diet, exercise and medicine

32. (Compulsory question):

Given:

$$[\text{OH}^-] = 1 \times 10^{-11} \text{M}$$

$$\text{pH} = ?$$

Formulas:

$$\text{pOH} = -\log(\text{OH}^-)$$

$$\text{pH} + \text{pOH} = 14$$

Substitution and calculation:

$$\begin{aligned} \text{pOH} &= -\log(1 \times 10^{-11}) \\ &= -[\log(1) + \log(10^{-11})] \\ &= -[0 + (-11) \log(10)] \\ &= -[-11 \times 1] \end{aligned}$$

$$\text{pOH} = 11$$

$$\begin{aligned} \therefore \text{pH} &= 14 - \text{pOH} \\ &= 14 - 11 \end{aligned}$$

$$\therefore \text{pH} = 3$$

PART – IV

33. i) a) $H = I^2 R t$

The heat produced in a resistor is:

- directly proportional to the square of the current passing through the resistor.
- directly proportional to the resistance of the resistor.
- directly proportional to the time for which the current is passing through the resistor.

b) Alloy of Nickel and Chromium is used as the heating element because:

- it has high resistivity,
- it has a high melting point,
- it is not easily oxidized

c) When a large current passes through the circuit, the fuse wire melts due to Joule's heating effect and hence the circuit gets disconnected. Therefore, the circuit and the electric appliances are saved from any damage.

OR

ii) Please refer to page no. 77 in text book.

34. i) Importance of pH in life:

i) pH sensitivity of animals and plants:

Our body works within the pH range of 7.0 to 7.8.

Living organisms survive in a narrow range of pH change.

pH range of blood is 7.35 to 7.45. Increase or decrease in this value leads to diseases. The ideal pH for blood is 7.4.

ii) pH in our digestive system:

Our stomach produces hydrochloric acid. It helps in the digestion of food without harming the stomach. Stomach produces too much acid and this causes pain. pH of the stomach fluid is 2.0.

iii) pH changes as the cause of tooth decay:

pH of the saliva ranges between 6.5 to 7.5. When it falls below 5.5, the white enamel gets weathered. Toothpastes (basic) used for cleaning the teeth can neutralise the excess acid and prevent tooth decay.

(iv) pH of soil in agriculture: Citrus fruits require slightly alkaline soil, while rice requires acidic soil and sugarcane requires neutral soil.

v) pH of rain water: The pH of rain water is approximately 7, It is neutral and highly pure. If the atmospheric air is polluted with oxide gases of sulphur and nitrogen, they get dissolved in the rain water and make its pH less than 7. If the pH of rain water is less than 7, it is called

acid rain. When acid rain flows into the rivers it lowers the pH of the river water also.

OR

ii) Homologous series is a group or a class of organic compounds having same general formula and similar chemical properties in which the successive members differ by a - CH₂ group.

Methane - CH₄

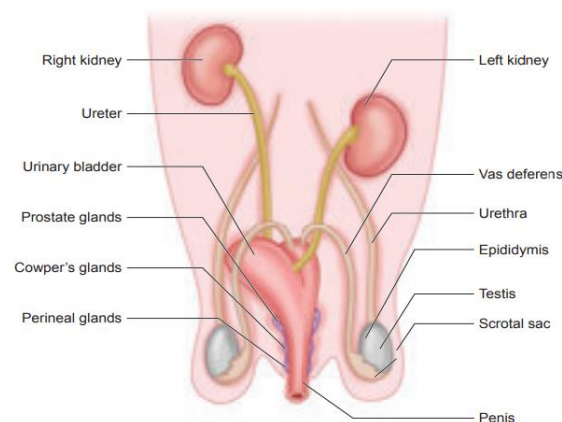
Ethane - CH₃CH₃

Propane - CH₃CH₂CH₃

Characteristics: (any three)

- Each member of the series differs from the preceding or succeeding member by one methylene group (-CH₂) and hence by a molecular mass of 14 amu.
- All members of a homologous series contain the same elements and functional group.
- They are represented by a general molecular formula. e.g. Alkanes, C_nH_{2n} + 2.
- The members in each homologous series show a regular gradation in their physical properties with respect to their increase in molecular mass.
- Chemical properties of the members of a homologous series are similar.
- All the members can be prepared by a common method.

35. i) The male reproductive system of rabbit consists of a pair of testes which are ovoid in shape. Testes are enclosed by scrotal sacs in the abdominal cavity. Each testis consists of seminiferous tubules which lead into a coiled tubule epididymis, which lead into the sperm duct called vas deferens. The vas deferens join in the urethra below the urinary bladder. The urethra runs backward and passes into the penis. There are three accessory glands namely prostate gland, cowper's gland and perineal gland. Their secretions are involved in reproduction.



OR

ii) Importance of forest:

Forests are an important component of our environment and are dominated by microorganisms, flowering plants, shrubs, climbers, dense trees and provide a vast habitat for wild animals.

Forests also contribute to the economic development of our country. Forests are vital for human life, it is a source for a wide range of renewable natural resource.

They provide wood, food, fodder, fibre and medicine. Forests are major factor of environmental concern.

They act as carbon sink, regulate climatic conditions, increase rainfall, reduce global warming, prevent natural hazards like flood and landslides, protect wildlife and also act as catchments for water conservation.

They also play a vital role in maintaining the ecological balance.

Tips for scoring high marks:

- Give a neat presentation.
 - Box the formulas and results in numerical problems.
 - Underline the key words in 2, 4 and 7 mark questions.
 - Give side headings for 2, 4 and 7 marks questions.
- Stick to the order of questions as in question paper. Avoid changing the order.
- Attempt all questions. Write with confidence.
- Success is not a one day event. It is accumulation of our daily habits. Choose your habits wisely.

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Disclaimer: Any errors in the answer key may please be brought to the notice of the writer.

Kindly send me your questions and answerkeys to us : Padasalai.Net@gmail.com