

XTH QUARTERLY EXAMINATION SCIENCE ANSWER KEY - 2024 DINDIGUL DISTRICT

PART -A**I. CHOOSE THE CORRECT ANSWER:****(12 x 1 =12)**

1. One kilogram force equals to _____ c) 98×10^4 dyne
2. The value of universal gas constant _____ d) $8.31 \text{ mol}^{-1} \text{ K}^{-1}$
3. Kilowatt hour is the unit of _____ c) electrical energy
4. 1 mole of any substance contains ___ molecules. a) 6.023×10^{23}
5. Which of the following have inert gases 2 electrons in the outermost shell. a) He
6. When pressure is increased at constant temperature the solubility of gases in liquid _____. b) increases
7. Which is formed during anaerobic respiration? b) Ethyl alcohol
8. The wall of human heart is made of _____ d) All of the above
9. Nerve cells do not possess _____ (b) sarcolemma
10. Which organ acts as both exocrine gland as well as endocrine gland? a) Pancreas
11. Which one of the following is an IUCD? a) Copper - T
12. The region of the chromosome where the spindle fibres get attached during cell Division _____ c) Centromere

II. ANSWER ANY 7 QUESTION. QUESTION NO: 22 COMPULSORY.**(7 x 2 =14)****13. State Rayleigh's law of scattering**

- ❖ The amount of scattering of light is inversely proportional to the fourth power of its wavelength. $S \propto 1/\lambda^4$

14. Distinguish between linear, arial or superficial expansion.

- i) **Liner Expansion:** When a body is heated, the length of the body changes.

$$\alpha_L = \Delta L/L_0\Delta T$$

- ii) **Arial Expansion or superficial expansion:** When a body is heated, the area of the body changes . $\alpha_A = \Delta A/A_0\Delta T$

15. Why is tungsten metal used in bulbs, but not in fuse wires?

- ❖ Tungsten has a very high melting point.
- ❖ It will not melt when a large amount of current is passed through it and the appliance will be damaged.

16. What is rust? Give the equation for formation of rust.

When iron is exposed to moist air, it forms a layer of brown hydrated ferric oxide on its surface. This compound is known as rust and the phenomenon of formation of rust is known as rusting.



17. Why is the teeth of rabbit called heterodont?

As there are three different kinds of teeth (Incisors, Premolars and Molars) in rabbit, the dentition is called heterodont.

18. MATCH THE FOLLOWING:

1. Symplastic pathway	Leaf
2. Transpiration	Plasmodesmata
3. Osmosis	Pressure in xylem
4. Root Pressure	Pressure gradient

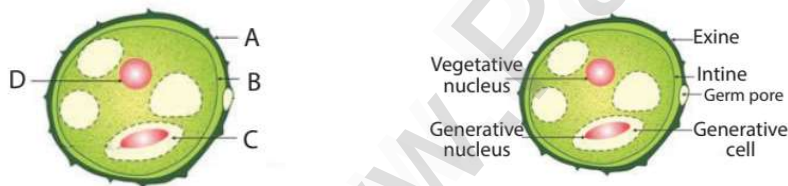
Answer:

1. Symplastic pathway - Plasmodesmata
2. Transpiration - Leaf
3. Osmosis - Pressure gradient
4. Root pressure - Pressure in xylem

19. Why are thyroid hormones referred as personality hormone?

- ❖ Thyroid hormones Triiodothyronine and Thyroxine
- ❖ It is essential for normal physical, mental and personality development, they are also known as personality hormone.

20. Identify the parts A, B, C and D



21. What do you understand by the term phenotype and genotype?

- ❖ **Phenotype** : External expression of a particular trait.
- ❖ **Genotype** : Genetic expression of an organism

22. 3.5 litres of ethanol is present in 15 litres of aqueous solution of ethanol. Calculate volume percent of ethanol solution.

Volume of ethanol = 3.5 lit = 3500 ml ; Volume of water = 15 lit = 15000 ml

$$\text{Volume percentage} = \frac{\text{Volume of the solute}}{\text{Volume of the solute} + \text{Volume of the solvent}} \times 100$$

$$\frac{3500}{3500 + 15000} \times 100 = 18.92\%$$

The volume percentage of ethanol solution = 18.92

III. ANSWER ANY 7 QUESTION. QUESTION NO: 32 COMPULSORY. (7 x 4 = 28)

23. What is universal law of gravitation? Write any 2 applications.

Universal law of gravitation:

Every particle of matter in this universe attracts every other particle with a force. This force is directly proportional to the product of their masses and inversely proportional to the square of the distance between the centres of these masses.

$$F \propto m_1 \times m_2 / r^2$$

Applications:

- ❖ Helps in discovering new stars and plants.
- ❖ To Explain the germination of roots using geotropism.
- ❖ To predict the path of the astronomical bodies.

24. Differentiate the eye defects: Myopia and Hypermetropia

Myopia	Hypermetropia
Short sightedness	Long sightedness.
Lengthening of eye ball	Shortening of eye ball.
Nearby objects can be seen clearly	Distant objects can be seen clearly
The image formed before retina.	The image formed behind retina.
Corrected by using concave lens.	Corrected by using concave lens.

25. Calculate the % of each element in calcium carbonate. (Atomic mass: C-12, O-16,

Ca -40)

Mass % of an element

$$= \frac{\text{mass of that element in the compound}}{\text{molecular mass of the compound}} \times 100$$

Molar mass of $\text{CaCO}_3 = 100$

% of Ca = Mass of Ca in the compound / Molar mass of $\text{CaCO}_3 \times 100$

$$= 40 / 100 \times 100 = 40\%$$

% of C = Mass of C in the compound / Molar mass of $\text{CaCO}_3 \times 100$

$$= 12 / 100 \times 100 = 12\%$$

% of O = Mass of oxygen in the compound / Molar mass of $\text{CaCO}_3 \times 100$

$$= 3 \times 16 / 100 \times 100 = 48\%.$$

26. a) Identify the bond between H and F in HF molecule. **Ionic bond**
- b) What property forms the basis of identification? **Electronegativity**
- c) How does the property vary in periods and in groups?
- Along the period, from left to right in the periodic table, the electronegativity increases.
 - On moving down a group, the electronegativity of the elements decreases

27. a) What is collateral vascular bundle?

Xylem lies towards the centre and phloem lies towards the periphery.

b) Where does the carbon that is used in photosynthesis come from?

Carbon dioxide taken from atmosphere

c) What is the common step in aerobic and anaerobic path way? **Glycolysis**

28. How does locomotion take place in leech?

Locomotion in leech takes place by

(i) Looping or crawling movement and (ii) Swimming movement.

i) Looping or crawling movement :

- ❖ This type of movement is brought about by the contraction and relaxation of muscles.
- ❖ The two suckers serve for attachment during movement on a substratum.

ii) Swimming movement :

- ❖ Leeches swim very actively and perform undulating movements in water.

29. i) STATE WHETHER TRUE OR FALSE. IF FALSE WRITE THE CORRECT STATEMENT:

- a) The phloem is responsible for the translocation of food. - **True**
- b) When guard cells lose water the stoma opens. - **False**

ii) What is cohesion?

The force of attraction between molecules of water is called cohesion

30. a) What are the structures involved in the protection of brain?

(i) Duramater (ii) Arachnoid (iii) Piamater

b) Define reflex arc.

The pathway taken by nerve impulse to accomplish reflex action is called reflex arc.

31. What is colostrum? How is milk production hormonally regulated?

- ❖ The first fluid which is released from the mammary gland after child birth is called as colostrum.
- ❖ Milk production is stimulated by prolactin secreted from the anterior pituitary.
- ❖ The ejection of milk is stimulated by posterior pituitary hormone oxytocin.

32. The resistance of a wire of length 10 m is 2 ohm. If the area of cross section of the wire is $2 \times 10^{-7} \text{ m}^2$, determine its (i) resistivity (ii) conductance and (iii) conductivity

Given: Length, $L = 10 \text{ m}$, Resistance, $R = 2 \text{ ohm}$ and Area, $A = 2 \times 10^{-7} \text{ m}^2$

$$\text{Resistivity, } \rho = \frac{RA}{L} = \frac{2 \times 2 \times 10^{-7}}{10}$$

$$= 4 \times 10^{-8} \Omega \text{ m}$$

$$\text{Conductance, } G = \frac{1}{R} = \frac{1}{2} = 0.5 \text{ mho}$$

$$\text{Conductivity, } \sigma = \frac{1}{\rho} = \frac{1}{4 \times 10^{-8}}$$

$$= 0.25 \times 10^8 \text{ mho m}^{-1}$$

IV. ANSWER VERY BRIEFLY:**(3 x 7 = 21)****33. A) Deduce the equation of a force using Newton's second law of motion.**

Let us consider, m - mass of the body, u - Initial velocity, v - Final velocity
 t - time taken, F - External force

Proof: Initial momentum (P_i) = mu Final momentum (P_f) = mv

$$\therefore \text{ change in momentum } (\Delta P) = P_f - P_i = mv - mu = m(v - u)$$

According to Newton's second law of motion,

$F \propto$ rate of change in momentum

$F \propto$ change in momentum / time

$$F \propto m(v - u) / t$$

$$F = k m(v - u) / t, \quad k - \text{is constant} (k = 1)$$

$$F = m(v - u) / t \quad \therefore \text{Acceleration } (a) = (v - u) / t$$

$$F = ma \quad \text{or} \quad \text{Force} = \text{mass} \times \text{acceleration}$$

[OR]**B) Derive the ideal gas equation.**

An ideal gas obeys Boyle's law and Charles's law and Avogadro's law.

\Rightarrow Boyle's law, $PV = \text{constant} \dots (1)$

⇒ Charles's law, $V/T = \text{constant} \dots (2)$

⇒ Avogadro's law, $V/n = \text{constant} \dots (3)$

Combining three equations, $PV/nT = \text{constant} \dots (4)$

Substitute $n = \mu N_A$

Equation (4) can be written as $PV/\mu N_A T = \text{constant}$

Constant, k_B Boltzmann's constant.

$$PV/\mu N_A T = k_B$$

$$PV = \mu N_A k_B T$$

∴ $\mu N_A k_B = R$ (universal gas constant)

$PV = RT \dots (5)$ This is called ideal gas equation.

34. A) Calcium carbonate is decomposed on heating in the following reaction



a) How many moles of Calcium carbonate is involved in this reaction?

1 mole of CaCO_3 is involved in this reaction.

b) Calculate the gram molecular mass of calcium carbonate involved in this reaction.

Gram molecular mass of calcium carbonate

$$\text{CaCO}_3 = (40 + 12 + 3 \times 16) = 52 + 48 = 100 \text{ g}$$

c) How many moles of CO_2 are there in this equation?

1 mole of CO_2 is in this equation.

[OR]

B) Write notes on various factors affecting solubility.

i) Nature of the solute and solvent

❖ Non polar compound do not dissolve in polar solvents. Polar compounds do not dissolved in Non polar solvents.

ii) Effect of temperature

a) Solubility of solid in liquid:

❖ Solubility of a solute in a liquid solvent increases with increase in temperature.

b) Solubility of gases in liquid:

❖ The solubility of gas is more at lower temperature whereas it decreases with increasing temperature.

iii) Effect of Pressure:

❖ When the pressure is increased, the solubility of a gas is also increased.

35. A) (i) Name the gaseous plant hormone. Describe its three different actions in plants. Ethylene.

Its three different actions in plants.

- ❖ Ethylene promotes the ripening of fruits.
- ❖ Ethylene inhibits the elongation of stem and root in dicots.
- ❖ Ethylene hastens the senescence of leaves and flowers.

(ii) Which hormone is known as stress hormone in plants ? Why?

- ❖ Abscisic acid. Because it increases tolerance of plants to various kinds of stress.
- ❖ So, it is also called as stress hormone.

(iii) What is bolting?

- ❖ **Bolting** : Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by flowering.

[OR]

B) . How is the structure of DNA organised? What is the biological significance of DNA?

Structure of DNA:

- ❖ DNA – Deoxy Ribose Nucleic Acid.
- ❖ Proposed by Watson and Crick in 1959.
- ❖ DNA is made up of 4 Base pairs of Nucleotides.
- ❖ Adenine always pairs with Thymine with two hydrogen bond.
- ❖ Guanine always pairs with Cytosine with three hydrogen bond.
- ❖ Each turn of the double helix is 34 \AA

Significance:

- ❖ It is responsible for the transmission of hereditary information from one generation to next generation.
- ❖ It contains information required for the formation of proteins.
- ❖ It controls the developmental process and life activities of an organism.

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