XTH HALF YEARLY EXAMINATION SCIENCE ANSWER KEY - 2024 DINDIGUL DISTRICT

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PART -A

I. CHOOSE THE CORRECT ANSWER. (12 x 1 =12)

1. The unit of 'g' is m s-2. It can be also expressed as

a) cm s^{-1} b) N kg^{-1} c) N m^2kg^{-1} d) cm^2 s^{-2}

2. If a substance is heated or cooled, the linear expansion occurs along the axis of

a) X or –X b) Y or –Y c) both (a) and (b) d) (a) or (b)

3.The frequency, which is audible to the human ear is

a) 50 kHz b) 20 kHz c) 15000 kHz d) 10000 kHz

4. The molecular formula for Ozone

a) O b) O_2 c) O_3 d) O_4

5. Rare gases electron affinities are_____

a) Positive value b) Zero c) Negative value d) Both a and c

6. _____ is an importa nt metal to form amalgam.

a) Ag b) Hg c) Mg d) Al

7. The endarch condition is the characteristic feature of

a) root b) stem c) leaves d) flower

8. The body of leech has

a) 23 segments b) 33 segments c) 38 segments d) 30 segments

9. Okasaki fragments are joined together by _____.

a) Helicase b) DNA polymerase c) RNA primer d) DNA ligase

10. The 'use and disuse theory' was proposed by _____.

a. Charles Darwin b. Ernst Haeckel c. Jean Baptiste Lamarck d. Gregor Mendel

11. World 'No Tobacco Day' is observed on

a) May 31 b) June 6 c) April 22 d) October 2

12. All files are stored in the _____

a) Folder b) box c) Pai d) scanner

PART-II

II ANSWER ANY 7 QUESTIONS (Q.NO:22 IS COMPULSORY).

13. State Snell's law.

- The ratio of the sine of the angle of incidence and sine of the angle of refraction is equal to the ratio of refractive indices of the two media.
- $\frac{\sin i}{\sin r} = \frac{\mu 2}{\mu 1}$

14. MATCH THE FOLLOWING:

1. Infrasonic	(a) Compressions
2. Echo	(b) 22 kHz

3. Ultrasonic	(c) 10 Hz
4. High pressure region	(d) Ultrasonography

Answer:

1. Infrasonic - 10 Hz
2. Echo – Ultrasonography
3. Ultrasonic - 22 kHz
4. High pressure region - Compressions

15. Define: Atomicity

- The number of atoms present in the molecule is called as its atomicity.
- Ex. HCl- no. of atoms: 2 – Atomicity -2

16. Write any uses of Copper.

i. It is used for making utensils, containers, calorimeters and coins,
ii. It is used in electroplating.
iii. It is alloyed with gold and silver for making coins and jewels.

17. Name the simplest ketone and give its structural formula.

- Simplest Ketone is **acetone**
- Structural formula - CH_3COCH_3

18. What is Respiratory Quotient (R.Q)?

It is the ratio of volume of carbon dioxide liberates and the volume of oxygen consumed during respiration.

$$RQ = \frac{\text{Volume of } CO_2 \text{ liberated}}{\text{Volume of } O_2 \text{ consumed}}$$

19. State whether true or false. If false write the correct statement:

a) Plants lose water by the process of transpiration. – True
b) WBC defend the body from bacterial and viral infections. – True

20. Define Ethnobotany.

- Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of the local culture of people.

21. How are e-wastes generated?

- E-wastes are generally called as electronic wastes.
- They are generated from the spoiled, outdated, non repairable electrical and electronic devices.

22. At what temperature will the velocity of sound in air be double the velocity of sound in air at 0^oC?

Let T^o C be the required temperature. Let v_1 and v_2 be the velocity of sound at temperatures T_1K and T_2K respectively.

$T_1 = 273K\ (0^o\ C)$ and $T_2 = (T^o\ C + 273)K$

$$\frac{v_2}{v_1} = \sqrt{\frac{T_2}{T_1}} = \sqrt{\frac{273 + T}{273}} = 2$$

Here, it is given that, v2 / v1 = 2.

So, 273 + T/ 273= 4

$T = (273 \times 4) - 273 = 819^o\ C$

PART-III

II ANSWER ANY 7 QUESTIONS (Q.NO:32 IS COMPULSORY).

23. List any five properties of light.

- Light is a form of energy.
- Light always travels along a straight line.
- Light does not need medium for its propagation.
- The speed of light in air is $C = 3 \times 108 ms^{-1}$
- Light is in the form of waves.
- Violet light has the lowest wavelength, and red light has the highest wavelength.

24. Compare Nuclear fission and nuclear fusion.

Nuclear Fission	Nuclear Fusion
The process of breaking up of a heavy nucleus into two smaller nuclei	Combination of two lighter nuclei to form a heavier nucleus.
Can be performed at room temperature.	Extremely high temperature and pressure is needed.
Alpha, beta and gamma radiations are emitted.	Alpha rays, positrons, and neutrinos are emitted.
Fission leads to emission of gamma radiation.	Only light and heat energy is emitted.

25. a) Define the unit of current.

- A charge of one coulomb flows across any cross section of conductor in one second.
- Ampere (A) ∴ 1 Ampere = 1 coulomb / 1 second.

b) State Ohm's law.

At a constant temperature, the steady current 'I' flowing through a conductor is directly proportional to the potential difference 'V' between two ends of the conductor.

$$V = IR$$

26. a) 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.

$$4Fe + 3O_2 + x\ H_2O \rightarrow 2Fe_2O_3.xH_2O\ (rust)$$

b) Name the acid that renders aluminium passive. Why?

- The acid that renders aluminium passive is dilute orconcentrated nitric acid.
- Aluminium becomes passive due to the formation of anoxide film on its surface.

27. Explain the mechanism of cleansing action of soap.

- Polar end is attracted to water.
- Non-polar end is attracted to dirt on the cloth.
- The non polar end of the soap molecule traps the dirt
- The polar end make the entire molecule soluble in water.
- When a soap is dissolved in water, the molecules join together as clusters called micelles.
- The polar end of the soap molecules makes the micelles soluble in water.
- Thus the dirt is washed away with the soap.

28. List out the parasitic adaptations in leech.

- Blood is sucked by pharynx.
- Anterior and posterior suckers help the leech attacks itself to the body of the host.
- The three jaws inside the mouth, causes a painless Y–shaped wound in the skin of the host.
- Blood is stored in the crop.
- Parapodia and setae are completely absent.
- The salivary glands produce hirudin which does not allow the blood to coagulate. Thus, a continuous supply of the blood is maintained.

29. Enumerate the functions of blood.

- Transport of respiratory gases
- Transport of digested food materials to the different body cells.
- It is involved in protection of the body and defense against diseases.
- It acts as buffer and helps in regulation of pH and body temperature.
- It maintains proper water balance in the body.

30. a) Define triple fusion.

- The fusion of second sperm (n) with secondary nucleus (2n) is known as triple fusion. As the result of triple fusion endosperm nucleus is formed.
- Second sperm (n) + Secondary nucleus (2n) = Endosperm nucleus (3n).

b) What do you understand by the term phenotype and genotype?

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

31. Differentiate between Type-I and Type-II Diabetes mellitus.

Factors	Type I - Insulin dependent diabetes mellitus (IDDM)	Type II - 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	Obese
Defect	Insulin deficiency due to destruction of β-cells	Target cells do respond to insulin
Treatment	Insulin administration is necessary	Can be controlled by diet, exercise and medicine.

32. Calculate the pH of 1×10^{-4} molar solution of NaOH

Solution: NaOH is a strong base and dissociates in its solution as:

$NaOH\ (aq) \rightarrow Na^{+}(aq) + OH^{-}(aq)$

One mole of NaOH would give one mole of OH– ions. Therefore,

$[OH^{-}] = 1 \times 10^{-4}$ mol litre^{-1}

$pOH = -\log_{10}[OH^{-}] = -\log_{10} \times [10^{-4}]$

$= -(-4 \times \log_{10}10) = -(-4) = 4$

Since, $pH + pOH = 14$

$pH = 14 - pOH = 14 - 4 = 10$

PART-IV

II ANSWER IN DETAIL:

33. 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 (Pi) = mu Final momentum (Pf) = mv

$\therefore$ change in momentum (ΔP) = Pf – Pi = mv – mu = m(v –u)

According to Newton's second law of motion ,

F α rate of change in momentum

F α change in momentum / time

F α m (v – u) / t

F = k m (v –u) / t , k – is constant(k = 1)

F = m (v – u) / t $\therefore$ Acceleration (a) = (v – u) / t

F = ma or Force = mass x acceleration

(OR)

33. a) State Joule's law of heating.

Joules' law of heating states that the heat produced in any resistor is Directly proportional to

- the square of the current passing through the resistor.
- the resistance of the resistor.
- the time for which the current passing through the resistor.
- $H = I^2Rt$

b) An alloy of nickel and chromium is used as the heating element. Why?

(i) It has high resistivity.

(ii) It has a high melting point.

(iii) It is not easily oxidized.

c) How does a fuse wire protect electrical appliances

When a large current passes through the circuit, the fuse wire melts due to joule's heating effect and hence the circuit gets disconnected.

34. a) Give the salient features of "Modern atomic theory".

- An atom is no longer indivisible.
- Atoms of the same element may have different atomic mass.
  Ex – isotopes $_{17}Cl^{35}$, $_{17}Cl^{37}$.
- Atoms of different elements may have same atomic masses.
  Ex – Isobars $_{18}Ar^{40}$, $_{20}Ca^{40}$.
- Atoms of one element can be transmuted into atoms of other elements.
- Atoms may not always combine in a simple whole number ratio.
  Eg: Glucose $C_6H_{12}O_6$
- Atom is the smallest particle that take part in a chemical reaction.
- Mass of an atom can be converted into energy. $E = mc^2$.

b) Calculate the number of water molecule present in one drop of water which weighs 0.18 g.

The molecular mass of water (H_2O) is 18.

18 g of water molecule = 1 mole.

0. 18 g of water = $\frac{1}{18} \times 0.18 = 0.01$ mole.

1 mole of water (Avogadro's number) contains 6.023×10^{23} water molecules.

0. 01 mole of water contain $\frac{6.023 \times 10^{23}}{1} \times 0.01 = 6.023 \times 10^{21}$ molecules.

(OR)

B) How is ethanol manufactured from sugarcane?

- Ethanol is manufactured from molasses.
- Molasses obtained the manufacture of sugar from sugarcane.

(i) Dilution of molasses: Molasses is first diluted with water

(ii) Addition of Nitrogen Source

If the nitrogen content of the molasses is poor, ammonium salts is added

(iii) Addition of yeast

- The solution obtained is collected to in large fermentation tanks and yeast is added to it.
- The mixture is kept at about 303 K for few days.
- During this period, the enzymes invertase about the conversion of sucrose.

$$\underset{\text{Sugar}}{C_{12}H_{22}O_{11}} + H_2O \xrightarrow{\text{invertase}} \underset{\text{glucose}}{C_6H_{12}O_6} + \underset{\text{fructose}}{C_6H_{12}O_6}$$

$$\underset{\text{glucose or fructose}}{C_6H_{12}O_6} \xrightarrow{\text{zymase}} \underset{\text{ethanol}}{2C_2H_5OH} + 2\,CO_2$$

(iv) Distillation of Wash.

- The fermented liquid containing 15 to 18 % alcohol
- It is subjected to fractional distillation and becomes rectified spirit with 95.5 % alcohol
- And then its refluxed over quick lime for about 5 to 6 hours and then allowed to stand for 12 hours
- On distillation of this mixture, pure alcohol (100%) is obtained.

35. a) Discuss the importance of biotechnology in the field of medicine.

- Insulin used in the treatment of diabetes.
- HGH for growth deficiencies.
- Blood clotting factors for haemophilia.
- Tissue plasminogen activator to dissolve blood clot and to prevent heart attack.
- Vaccines for hepatitis B and Vaccines for rabies.

b) Define genetic engineering.

- It is technique of transfer of genes from one organism to another organism to create a new DNA called r DNA.
- It is also called recombinant DNA technology.

(OR)

35. a) How does rainwater harvesting structures recharge ground water?

- Rainwater harvesting is a technique of collecting and storing rainwater for future use.
- It is a traditional method of storing rain water.
- Purpose - to recharge 'groundwater level'.

Methods of rainwater harvesting :

- Roof top rainwater harvesting: Roof-tops are excellent rain catchers.
- The rain water that falls on the roof of the houses is collected and stored in the surface tank and can be used for domestic purpose.

Recharge pit:

- In this method, the rainwater is first collected from the roof tops or open spaces and is directed into the percolation pits through pipes for filtration.
- After filtration the rainwater enters the recharge pits or ground wells.

b) What is Stage?

- Stage is the background appearing when we open the scratch window.
- The background will most often be white.
- We can change the background colour as you like.

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