SARAS

BASED ON TAMILNADU STATE BOARD SYLLABUS

LeadeR

leads to ultimate success

SCIENCE

QUESTION BANK

Govt. Public Exam and PTA Questions and Answers

10th std

- Question pattern and distribution of marks in Govt. Public exam
- Govt. Public exam question paper with answers - April 2023, June 2023, May 2022, May 2021, September 2020
- PTA Questions with Answers - 6 Sets
- 1 mark Questions - 145 Nos
- 2 mark Questions - 110 Nos
- 5 mark Questions - 110 Nos
- 8 mark Questions - 34 Nos

Read just 100 pages, Score 100 Marks

SARAS PUBLICATION

SaraS 49 Years in Life Science book publishing since 1974

LeadeR

leads to ultimate success

10th std Science

Read just 100 pages, Score 100 marks

Question Bank

Govt. Public Exams and PTA - Questions and Answers

Contents

- Question pattern and distribution of marks in Govt. Public Exams
- Govt Public Exams - June 2023, April 2023, May 2022, May 2021, Sep 2020, Questions and Answers
- PTA Questions with Answers - 6 sets
- 1 Mark Questions - 145 Nos
- 2 Mark Questions - 110 Nos
- 4 Mark Questions - 110 Nos
- 7 Mark Questions - 34 Nos

SARAS PUBLICATION

SaraS Publication
Biosciences Book Publisher

10th Std, Leader : Science - Govt. Public Exams and PTA Questions and Answers

Edited and Reviewed by : A. Gopi, B.E., M.Tech.
Evaluated by : Dr. N. Arumugam, M.Sc.,M.Phil.,Ph.D.,FZI,FIAES
Compiled by : A. Saraswathi, M.Sc, B.Ed, K. Kamala Sree, M.Sc., M.Phil., B.Ed.
S. Sindhu, M.Sc., B.Ed.
Published by : Saras Publication, Nagercoil.
Educational book publisher since 1974
Printed by : Saras Offset Printers, 1337/5, Sattur Road,
Sivakasi - 626 189
Cell: 09842323441, **E-mail:**print@sarasprinters.in
First Edition : 2023

Price : Rs. 90/-
Pages : 104
Published by
SARAS PUBLICATION
114/35G, A.R.P. Camp Road,
Periavilai, Kottar P.O., Nagercoil,
Kanyakumari Dist - 629 002
Tamil nadu, India.
Telephone : 04652 265026
Cell phone : +91 7598265026, 09842123441
Whatsapp : +91 7598265026
Website:www.saraspublication.com
E-mail: info@saraspublication.com

Bank details

Bank Name	:	Canara Bank
A/C No	:	8590261000007
A/C Name	:	Saras Publication
IFSC Code	:	CNRB0008590
Branch	:	St Rita's Convent Branch, Nagercoil

UPI

UPI ID	:	saraspublication@icici
UPI Number	:	7598265026

Contents

Science: 10th Std

Govt. Public Exam Question Paper

Question Pattern and Distribution of Marks

	Science	75 Marks
Part - I Q1 to Q12	One mark questions 12 Multiple choice questions - No choice	12 x 1 = 12
Part - II Q13 to Q22	Two mark questions 7 questions out of 10; Q22 is Compulsory	7 x 2 = 14
Part - III Q23 to Q32	Four mark questions 7 questions out of 10, Q32 is Compulsory	7 x 4 = 28
Part - IV Q33 to Q35	Seven mark questions 3 questions out of 6; Internal choice (Or)	3 x 7 = 21

Solved Govt. Public Exam Question Paper - April 2023

Science - 10th Std

Time : 3.00 Hours Marks : 75

Part - I 12x1=12

1. Magnification of a convex lens is always:
a) Positive b) Negative c) Either positive (or) negative d) Zero
Ans: **c) Either positive (or) negative**

2. In which of the following reaction, the mass number decreases by four of the daughter nucleus?
a) α decay b) β decay c) γ decay d) neutron decay Ans: **a) α decay**

3. The gram molecular mass of water is :
a) 2g b) 16g c) 18g d) 8g Ans: **c) 18g**

4. Which of the following is the universal solvent?
a) Acetone b) Benzene c) Water d) Alcohol Ans: **c) Water**

5. The secondary suffix used in IUPAC nomenclature of an aldehyde is .....
a) -ol b)-oic acid c) -al d) -one Ans: **c)-al**

6. The heart of amphibians possess ..... chambers.
a) 3 b) 4 c) 2 d) 5 Ans: **a) 3**

7. Kreb's cycle takes place in .....
a) chloroplast b) mitochondrial matrix c) stomata
d) inner mitochondrial membrane Ans: **b) mitochondrial matrix**

8. Bipolar neurons are found in : Ans: **a) retina of eye**
a) retina of eye b) cerebral cortex c) embryo d) respiratory epithelium

9. Syngamy results in the formation of .....
a) zoospores b) conidia c) zygote d) chlamydospores Ans: **c) zygote**

10. Match the following : Ans: **a) 1 - (iii), 2 - (iv), 3 - (ii), 4 - (i)**

1) Sarcoma	(i) Excessive hunger	a) 1 - (iii), 2 - (iv), 3 - (ii), 4 - (i)
2) Carcinoma	(ii) Excessive thirst	b) 1 - (iv), 2 - (iii), 3 - (i), 4 - (ii)
3) Polydipsia	(iii) Connective tissue cancer	c) 1 - (i), 2 - (iii), 3 - (iv), 4 - (ii)
4) Polyphagia	(iv) Stomach cancer	d) 1 - (iv), 2 - (i), 3 - (ii), 4 - (iii)

11. 9 : 3 : 3 : 1 ratio is due to :

a) Segregation b) Crossing over c) Independent assortment
d) Recessiveness Ans: **c) Independent assortment**

12. The term Ethnobotany was coined by : Ans: **b) J. W. Harshberger**

a) Khorana b) J. W. Harshberger c) Ronald Ross d) Hugo de Vries

Part -II

7x2=14

13. Define inertia. Give its classification.

The inherent property of a body to resist any change in its state of rest or the state of uniform motion, unless it is influenced upon by an external unbalanced force.

Classification

Inertia is classified as the following:

1. Inertia of rest 2. Inertia of motion 3. Inertia of direction

14. Why does the sky appear blue in colour?

- When sunlight passes through the atmosphere, *the fine (small) particles in air scatter the blue colour (shorter wavelengths) in all directions more strongly than other colours.*
- The scattered blue light reaches our eyes.

15. Define one Calorie.

Amount of heat required to rise the temperature of one gram of water through 1°C.

16. Mention any two applications of Avogadro's Law.

1. Avogadro's law explains ***Gay-Lussac's law.***
2. It helps in the determination of ***atomicity*** of gases.
3. ***Molecular formula*** of gases can be derived.
4. It determines the relationship between ***molecular mass*** and ***vapour density.***
5. It helps to determine ***gram molar volume*** of all gases. (ie. 22.4 liter at S.T.P)

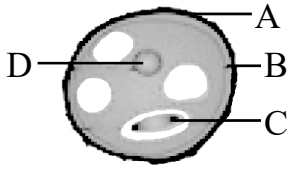
17. List out the parasitic adaptations in leech.

1. Suckers	- For attachment
2. Jaws	- Cause painless wound
3. Muscular pharynx	- Sucks the blood
4. Crop	- To store blood
5. Hirudin	- Prevents ***coagulation*** of blood.
6. Digestive glands are absent	- The food-blood is in the liquid form.
7. Anaesthetic substance.	
8. Slow digestion.	
9. Parapodia and setae are completely absent.	

18. What are the structures involved in the protection of brain?

1. Skull 2. Dura mater - Outer
3. Arachnoid membrane - Middle 4. Pia mater - Inner

19. Identify the parts A, B, C and D in the given figure.



Ans:

A - Exine
B - Intine
C - Generative cell
D - Vegetative nucleus

20. Define genetic engineering.

Genetic engineering is the ***manipulation*** and ***transfer of genes*** from one organism to another organism to produce rDNA.

Genetic engineering is also called ***recombinant DNA technology.***

21. What is Sprite?

- The ***characters*** on the back ground of a ***scratch window*** are known as sprite.
- Sprite is a type of ***editor.***
- A ***cat*** appears as a sprite when the scratch window is opened.
- This ***software*** provides facilities to make alterations in sprite.

22. Calculate the amount of energy released when a radioactive substance undergoes fusion and results in a mass defect of 2 kg.

Solution:

Mass defect in the reaction (m) = 2 kg

Velocity of light (c) = 3×10^8 ms^{-1}

By Einstein's equation,

Energy released $E = mc^2$

So $E = 2 \times (3 \times 10^8)^2$

$= \mathbf{1.8 \times 10^{17}\ J}$

Part - III

7x4=28

23. Deduce the equation of force using Newton's Second Law of Motion.

1. Let, ***'m'*** be the ***mass of a moving body.***
2. The moving body moves along a straight line with an ***initial speed 'u'.***
3. After a time interval of ***'t',*** the velocity of the body changes to ***'v'.***
4. The velocity of the body changes due to the impact of an unbalanced ***external force F.***
5. ***Initial momentum*** of the body $P_i = mu.$
6. ***Final momentum*** of the body $P_f = mv$
7. ***Change in momentum*** $\Delta p = P_f - P_i$
   $= mv - mu$
8. By Newton's second law of motion. Force, F α rate of change of momentum.
9. F α change in momentum / time.

$$F \alpha \frac{mv - mu}{t}$$

$$F = \frac{Km\,(v - u)}{t}$$

10. K is the ***proportionality*** constant.

K = 1 in all systems of units.

Hence,

$$F = \frac{m\,(v - u)}{t}$$

11. Since, acceleration = change in velocity / time

$a = (v - u) / t$

Hence, we have ***F = m x a***

Force = mass x acceleration

24. Differentiate the eye defects: Myopia and Hypermetropia.

Myopia	Hypermetropia
1. ***Short sightedness*** or near sightedness.	***Long sightedness*** or far sightedness.
2. ***Nearby objects*** can be seen ***clearly.***	Nearby objects cannot be seen clearly.
3. Distant objects cannot be seen clearly.	***Distant objects*** can be seen ***clearly.***
4. ***Far point*** has come closer.	***Near point*** has moved farther.
5. ***Image*** formed ***before*** retina.	***Image*** formed ***behind*** retina.
6. It is caused by (i) Lengthening of eyeball. (ii) Focal length of eye lens is reduced.	It is caused by (i) Shortening of eye ball. (ii) Focal length of eye lens is increased.
7. This can be corrected by using a ***concave lens.***	This can be corrected by using a ***convex lens.***

25. a) What do you understand by the term Ultrasonic Vibration?

Ultrasonic vibration

1. Sound waves with a ***frequency greater*** than ***20KHz*** are called ultrasonic vibration.
2. Human ear cannot detect these waves.
3. But certain creatures can detect these waves.
   Eg. Waves ***produced by bats***.

b) What is meant by reflection of sound?

When sound waves travel in a given medium and strike the surface of another medium, it can be bounced back into the first medium.

26. a) What is an amalgam? Give an example.

An alloy of mercury with another metal. Eg. ***Silver tin amalgam.***

b) Mention any two uses of copper.

1. Used in manufacturing ***electric cables*** and ***electric appliances***.
2. Used for making ***utensils, containers, calorimeters*** and ***coins.***
3. Used in ***electroplating***.
4. Alloyed with gold and silver for making ***coins*** and ***jewels***.

27. Explain the mechanism of cleansing action of soap.

1. A soap molecule has ***two*** distinct parts, namely
   1. ***Polar end*** 2. ***Non-polar end.***
2. Polar end is a short ***head.***
3. It is a ***carboxylate group*** (-COONa)
4. Polar end is ***hydrophilic***-water loving.

5. Polar end is ***attracted*** towards ***water.***
6. Non polar end is a long ***tail.***
7. It is a ***hydrocarbon chain.***
8. Non polar end is ***hydrophobic***- water hating.
9. It is ***attracted*** towards ***dirt*** or ***oil*** on the cloth.
10. The two parts of soap molecules interact differently with water.
11. The ***hydrophilic*** part makes the entire molecule soluble in water.

The hydrophobic part of the soap molecules ***traps dirt.***

When detergent is dissolved in water, the soap molecules join together as ***clusters*** called ***micelles.***

12. Long hydrocarbon chains ***attach*** to the oil and dirt.
13. The dirt is surrounded by the ***non-polar end*** of the soap molecule.
14. The ***charged carboxylate end*** of the soap molecules make the micelles soluble in water.
15. Thus the dirt is ***washed away*** with soap.

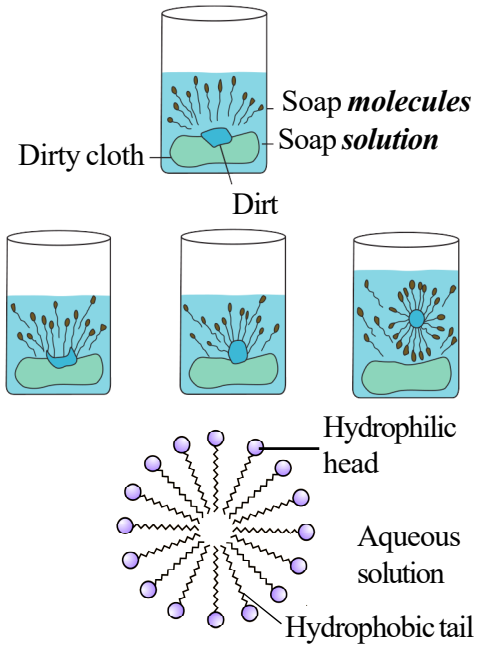


Fig. Cleansing action of soap.

28. a) Name the three basic tissue systems in flowering plants.

1. Dermal or epidermal tissue system.
2. Ground tissue system.
3. Vascular tissue system.

b) What are the factors affecting photosynthesis?

Internal Factors

1. Pigments *2. Leaf age* *3. Accumulation of carbohydrates* *4. Hormones*

External Factors

1. Light *2. Carbon dioxide* *3. Temperature*
4. Water *5. Mineral elements*

29. Enumerate the functions of blood.

1. Transport of ***respiratory gases*** (Oxygen and CO_2).
2. Transport of ***digested food*** materials.
3. Transport of ***hormones.***
4. Transport of nitrogenous excretory products like-
   - *Ammonia* - *Uric acid* - *Urea*
5. Involved in ***protection of the body*** and ***defence against diseases.***
6. Acts as ***buffer.***
7. Regulation of ***pH.***
8. Regulation of ***body temperature.***
9. Maintains proper ***water balance*** in the body.

30. How do rainwater harvesting structures recharge ground water?

1. Rain water harvesting can be done through the following methods:

1. *Roof top rain water harvesting*
2. *Recharge pit*
3. *Digging of tanks or Lakes-Eris*
4. *Ooranis*

2. Rain water is first collected from the ***roof tops*** or ***open spaces.***

3. Then, the collected water is directed into the ***percolation pits*** through pipes.

4. Percolation pits ***filter*** the rain water.

5. After filtration the rain water enters the ***recharge pits*** or ***ground wells.***

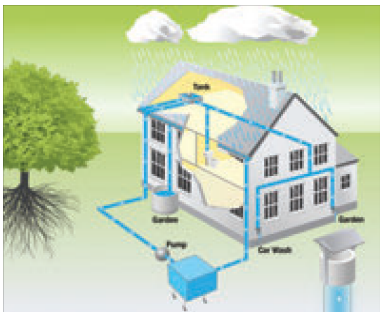


Fig. Rain water harvesting.

31. a) What do you understand by the term phenotype and genotype?

Phenotype

External expression of a particular trait.

Genotype

The ***genetic expression*** of an organism.

b) What are allosomes?

1. ***Sex chromosomes*** or ***heterochromosomes***.
2. Determine ***the sex of an individual.***
3. They are of ***two*** types. They are
   - *X - chromosomes*
   - *Y - chromosomes*

32. a) Calculate the pH of 0.01 M solution of HNO_3

Solution:

$[H^+] = 0.01$

$pH = -\log_{10}[H^+]$

$pH = -\log_{10}[0.01]$

$pH = -\log_{10}[1 \times 10^{-2}]$

$pH = -(\log_{10}1 - 2\log_{10}10)$

$pH = 0 + 2 \times \log_{10}10$

$pH = 0 + 2 \times 1 = 2$

pH = 2

b) A solution is prepared by dissolving 25g sugar in 100 g of water. Calculate the mass percentage of solute.

Given Data

Mass of the sugar (solute) = 25g

Mass of the water (solvent) = 100g

Mass of the solution = Mass of the solute + Mass of the solvent

= 25 + 100

= 125

$$\text{Mass percentage} = \frac{\text{Mass of the solute}}{\text{Mass of the solution}} \times 100$$

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

$$= \frac{25}{25+100} \times 100 = \frac{25}{125} \times 100$$

$$= 20\%$$

Mass percentage of solute is 20%

Part - IV

3x7=21

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

Heat produced in any resistor is,

* directly proportional to the ***square of the current.***
* directly proportional to the ***resistance.***
* directly proportional to the ***time.***

$$H = I^2Rt$$

H → Heat produced I → Current

R → Resistance t → time

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

An alloy, ***Nichrome*** is used as the heating element because,

* It has ***high resistivity.***
* It has ***high melting point.***
* It is ***not easily oxidized.***

c) How does a fuse wire protect electrical appliances?

1. The ***melting point*** of fuse wire is ***low.***
2. When a high current passes through the circuit, the ***fuse wire melts*** due to Joule's heating effect.
3. Hence, the circuit gets ***disconnected.***

* Therefore, the ***circuit and the electric appliances are saved*** from any damage.

b) i) What is a longitudinal wave?

1. Longitudinal waves are ***sound waves.***
2. Sound waves can travel through any ***medium***.
3. The ***particles*** of the medium ***vibrate*** along the ***direction*** of ***propagation*** of the wave.
4. This displacement involves the longitudinal displacements of the individual molecules from their mean positions.
5. This results in a series of high and low pressure regions called compressions and rarefactions.

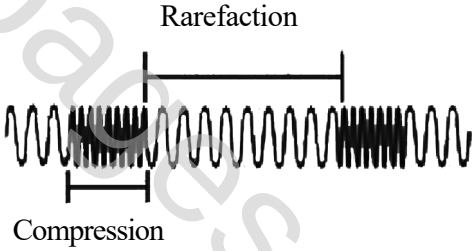


Fig. Sound propagates as longitudinal waves

ii) What is a nuclear reactor? Explain its essential parts with their functions.

Nuclear Reactor

A nuclear reactor is a device used to produce ***electricity.***

In this ***nuclear fission*** reaction takes place in a self-sustained and controlled manner.

Essential Parts of a Nuclear Reactor

Essential parts of a nuclear reactor are

1. Fuel	*2. Moderator*	*3. Control rod*
4. Coolant	*5. Protection wall*	*6. Heat exchange chamber*
7. Dynamo	*8. Transmission*	

1. Fuel

- A ***fissile material***
- The commonly used fuel is ***uranium***.

2. Moderator

- To ***slow down*** the ***high energy neutrons.***
- To provide ***slow neutrons.***
- Common Moderators
  1. *Graphite*
  2. *Heavy water*

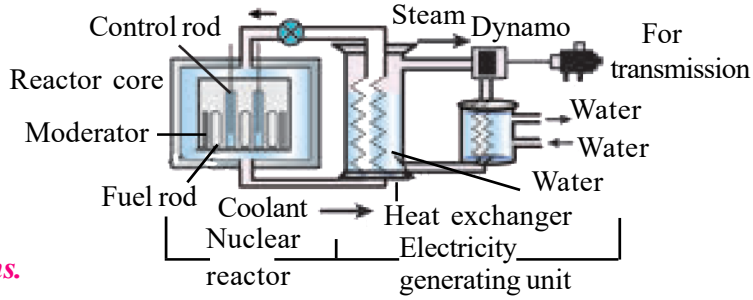


Fig. Nuclear reactor.

3. Control Rod

- To ***control*** the number of neutrons in order to have sustained chain reaction.
  ∗ *Boron rods or cadmium rods*
- They ***absorb*** the ***neutrons.***

4. Coolant

1. The nuclear fission in the reactor produces ***heat.***
2. This heat is used to produce ***steam.***
3. The steam is used to run a ***turbine*** in order to produce ***electricity***.
4. Coolants are used to remove the ***heat.***
5. ***Water***, ***air*** and ***helium*** are some of the coolants.

5. Protection Wall

1. A thick ***concrete lead*** wall is built around the nuclear reactor.
2. To prevent ***harmful radiations*** from escaping into the environment.

34. a. i) Define : Atomicity

The number of atoms present in the molecule.

ii) Calculate the percentage of sulphur in H_2SO_4.

Molecular mass of H_2SO_4 $= (1 \times 2) + (32 \times 1) + (16 \times 4)$

$= 2 + 32 + 64$

$= 98$ g

$$\% \text{ of S in } H_2SO_4 = \frac{\text{Mass of sulphur}}{\text{Molecular mass of } H_2SO_4} \times 100$$

$$\% \text{ of S in } H_2SO_4 = \frac{32}{98} \times 100$$

$$= \mathbf{32.65\ \%}$$

iii) In what way hygroscopic substances differ from deliquescent substances.

Hygroscopic substances	Deliquescence substances
1. When ***exposed*** to the atmosphere at ordinary temperature, they ***absorb*** moisture and ***do not*** dissolve.	When ***exposed*** to the atmospheric air at ordinary temperature, they ***absorb moisture*** and ***dissolve***.
2. They ***do not*** change their ***physical state*** on exposure to air.	They ***change*** their ***physical state*** on exposure to air.
3. ***Amorphous solids*** or ***liquids***.	They are ***crystalline solids***.

b) i) Differentiate reversible and irreversible reaction.

Reversible reaction	Irreversible reaction
1. It can be ***reversed.***	1. It ***cannot*** be reversed.
2. It is ***bidirectional.***	2. It is ***unidirectional.***
3. Both ***forward*** and ***backward*** reactions take place ***simultaneously.***	3. It proceeds only in ***forward*** direction.
4. It attains ***equilibrium.***	4. Equilibrium is ***not*** attained.
5. The reactants ***cannot be converted completely*** into products.	5. The reactants can be ***completely*** converted into products.
6. It is relatively ***slow.***	6. It is ***fast.***

ii) What is neutralization reaction? Give an example.

Neutralization Reactions

- *In neutralization reaction, an acid reacts with a base to form a neutral salt and water.*

Acid + Base → Salt + Water

- It is a type of ***double displacement*** reaction.

Example

- The reaction of ***sodium hydroxide*** with ***hydrochloric acid*** is a typical neutralization reaction. Here, sodium replaces hydrogen from hydrochloric acid forming sodium chloride a neutral solute salt.

$$NaOH_{(aq)} + HCl_{(aq)} \longrightarrow NaCl_{(aq)} + H_2O_{(l)}$$

iii) Give any three characteristics of homologous series.

Characteristics of Homologous Series

1. Each member of the series differs from the preceding or succeeding member by one ***methylene group*** ($-CH_2$) and hence by a molecular mass of ***14amu.***
2. All members of a homologous series contain the ***same elements*** and ***functional group.***
3. They are represented by a general molecular formula.
   Eg. *Alkanes,* C_nH_{2n+2}
4. ***Regular gradation*** in their physical properties with respect to their increase in ***molecular mass.***
5. Chemical properties are ***similar.***
6. All the members can be ***prepared*** by a common method.

35. a) i) Which hormone induces parthenocarpy in tomatoes?

Gibberellin

ii) Why is thyroid hormone referred as 'personality hormone'?

1. It is essential for ***physical, mental*** and ***personality*** development.
2. It controls ***growth*** of the ***body.***
3. It helps in ***bone formation*** and ***growth.***

4. It gives ***shape*** to the body.
5. It provides human ***physique.*** Hence it is called ***personality hormone.***

iii) Explain Lamarck's theories of evolution.

1. Lamarckism is called theory of ***inheritance of acquired characters*** or ***use*** and ***disuse theory.***
2. Lamarckism includes the following four principles:

1. Internal vital force *2. Environment and new needs*
3. Use and disuse theory *4. Theory of inheritance of acquired characters*

1. Internal Vital Force

1. Living ***organisms*** or their component ***parts*** continuously ***increase.***
2. It is due to ***internal vital force*** of the organisms.

2. Environment and New Needs

1. The environment ***changes.***
2. It creates ***new needs*** in organisms.
3. New needs produce ***adaptive characters.***
4. The adaptations may be in the form of development of ***new parts*** of the body.

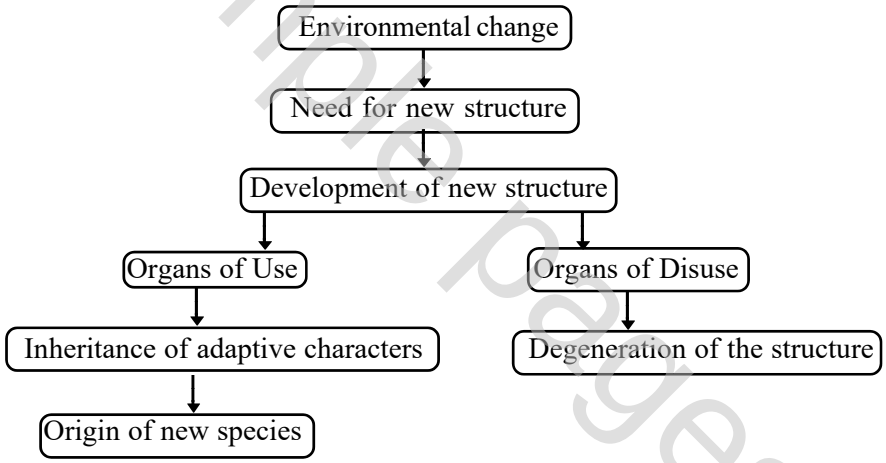


Fig. Flow chart showing the postulates of Lamarckism.

3. Use and Disuse Theory

1. If an organ is ***used constantly***, the organ develops well and gets strengthened. It is ***use theory***.
   Eg: Development of long neck and long forelimbs of ***Giraffe.***
2. If an organ is not used for a long time, it ***degenerates*** gradually. It is ***disuse theory***.
   Eg: Degenerated wing of ***kiwi.***

4. Theory of Inheritance of Acquired Characters

1. When there is a ***change*** in the environment, the animals ***respond*** to the change.
2. They develop ***adaptive structures.***
3. These characters are called ***acquired characters.***
4. The acquired characters are ***transmitted*** to the offspring by ***inheritance.***

b) i) Which enzyme cuts DNA at specific sites?

Restriction endonucleases cuts DNA at specific sites.

ii) Name two maize hybrids rich in amino acid lysine.

1. Protina *2. Shakti* *3. Ratna*

iii) Explain smoking hazards and the harmful effects of tobacco?

1. ***Benzopyrene*** and ***polycyclic hydrocarbons*** present in tobacco smoke are carcinogenic causing ***lung cancer.***

2. Inflammation of ***throat*** and ***bronchi*** leading to conditions like ***bronchitis*** and ***pulmonary tuberculosis.***

3. Inflammation of ***lung alveoli***.

4. Decrease in ***surface area*** for gas exchange and cause ***emphysema.***

5. ***Carbon monoxide*** of tobacco smoke binds to haemoglobin of RBC and decreases its oxygen carrying capacity causing ***hypoxia*** in body tissues.

6. Increased ***blood pressure***.

7. Increased risk of ***heart disease.***

8. Increased ***gastric secretion*** which leads to ***gastric*** and ***duodenal ulcers.***

9. Tobacco chewing causes ***oral cancer.***

Questions and Answers from Public Exam Question Papers - 2022, 2021, 2020 and PTA Question Papers

Part - I

1 Mark Questions

1. Where should an object be placed so that a real and inverted image of same size is obtained by a convex lens? **(May 2022)**
(a) f (b) infinity (c) 2f (d) Between f and 2f Ans: **(c) 2f**

2. If a molecule is made of similar kind of atoms, then it is called --------- molecule **(May 2022)**
(a) mono atomic (b) hetero atomic (c) homo atomic (d) poly atomic Ans: **(c) homo atomic**

3. The number of components in a binary solution is ---------- **(May 2022)**
(a) 2 (b)3 (c) 4 (d) 5 Ans: **(a) 2**

4. A charge of 12 coulomb flows through a bulb in 5 second. What is the current through the bulb? **(May 22)**
(a) 160 A (b) 17 A (c) 2.4A (d) 24 A Ans: **(c) 2.4 A**

5. Rectified spirit of an aqueous solution which contains about ---- of ethanol **(May 2022)**
(a) 95.5% (b) 75.5% (c) 55.5% (d) 45.5% Ans: **(a) 95.5 %**

6. The endarch condition is the characteristic feature of ---------- **(May 2022)**
(a) root (b) stem (c) leaves (d)flowers Ans: **(b) stem**

7. The heart of fishes possess ---------- chambers **(May 2022)**
(a) 3 (b) 4 (c) 2 (d) 5 Ans: **(c) 2**

8. Male gametes in angiosperms are formed by the division of ---------- **(May 2022)**
(a) generative cell (b) vegetative cell (c) pollen grain mother cell
(d) microspore Ans: **(a) generative cell**

9. Which one is referred as 'Master Gland'? **(PTA -2) (May 2022)** *Ans: **(b) Pituitary gland***
(a) Pineal gland (b) Pituitary gland (c) Thyroid gland (d) Adrenal gland

10. Himgiri developed by hybridization and selection for disease resistance against rust pathogens is a variety of ---------- **(May 2022)**
(a) chilli (b) maize (c) sugarcane (d) wheat Ans: **(d) wheat**

11. Match the following: **(May 2022)**

1. Solar energy	(i) Flowing water
2. Petroleum	(ii) Mobile phone
3. Hydropower	(iii) Inexhaustible energy
4. Electronic device	(iv) Exhaustible energy source

Ans: **b) (1)-(iii), (2)-(iv), (3)-(i), (4)-(ii)**
a) (1)-(iv), (2)-(iii), (3)-(ii), (4)-(i) b) (1)-(iii), (2)-(iv), (3)-(i), (4)-(ii)
c) (1)-(iii), (2)-(i), (3)-(iv), (4)-(ii) d) (1)-(i), (2)-(iv), (3)-(ii), (4)-(iii)

12. Find the correct pair **(May 2022)**
(a) Gregor Johann Mendel - Theory of Natural selection
(b) Waldeyer - Chromosomes
(c) Watson and Crick - Theory of Evolution
(d) Jean Baptiste Lamarck - Law of Heredity Ans**: (b) Waldeyer- Chromosomes**

13. To project the rockets which of the following principle (s) is/are required? **(May 2021)**
(a) Newton's third law of motion (b) Newton's law of gravitation
(c) Law of conservation of linear momentum (d) Both (a) and (c) Ans: **(d) Both (a) and (c)**

Part - II

2 Mark Questions

1. State Newton's second law. **(May 2022)**

2. Write any two applications of echo. **(May 2022)**

3. State Boyle's law. **(May 2022)**

4. Write the functional group and the suffix used for the following class of compounds. **(May 2022)**

Class of compounds	Functional group	Suffix used
Alcohols		
Aldehydes		
Ketones		
Carboxylic acid		

5. What is the importance of rainwater harvesting? **(May 2022)**

6. Identify the parts A,B,C,D in the given figure. **(May 2022)**

7. Name the two maize hybrids rich in amino acid lysine. **(May 2022)**

8. What is the importance of valves in the heart? **(May 2022)**

9. A person with myopia can see objects placed at a distance of 4 m. If he wants to see objects at a distance of 20 m. What should be the focal length and power of the concave lens he must wear? **(May 2022)**

10. When a sound wave travels through air, the air particles: **(May 2021)**

a) vibrate along the direction of the wave motion. b) vibrate but not in any fixed direction

c) vibrate perpendicular to the direction of the wave motion

d) do not vibrate Ans: **a) vibrate along the direction of the wave motion.**

11. a) What is the audible range of frequency? Ans : **20-20,000 Hz**

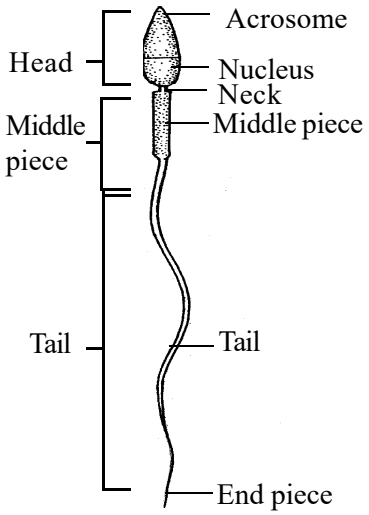
b) What is the minimum distance needed for an echo? **(May 2021)** Ans: **17.2m**

12. Write any two uses of ethanol. **(May 2021)**

1. Medical wipes, as an ***antiseptic.***
2. ***Anti-freeze*** in automobile radiators.

13. What is respiratory quotient? **(May 2021) (Refer Q.no.28(b), 2022)**

14. Draw and label the parts of a sperm. **(May 2021)**



19. How do rainwater harvesting structures recharge ground water? **(May 2021)**

1. Rain water harvesting can be done through the following methods:
   i) Roof top rain water harvesting *ii) Recharge pit*
   iii) Digging of tanks or Lakes-Eris *iv) Ooranis*
2. Rain water is first collected from the ***roof tops*** or ***open spaces.***
3. Then, the collected water is directed into the ***percolation pits*** through pipes.
4. Percolation pits ***filter*** the rain water.
5. After filtration the rain water enters the ***recharge pits*** or ***ground wells.***

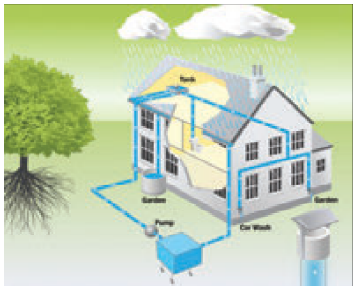


Fig. Rain water harvesting.

20. $_{92}U^{238}$ experiences α - decay. Find the number of neutrons in the daughter element? **(May 2021)**

Mass number of Th = 234
Atomic number of Th = 90
Number of neutrons = Mass number - Atomic number
= 234 - 90

No. of neutrons of Th = 144

21. Describe rocket propulsion. **(Sep 2020)**

1. Propulsion of rocket is based on the law of conservation of linear ***momentum*** as well as ***Newton's III law*** of motion.
2. Rockets are filled with a ***fuel*** in the propellant tank.
3. The fuel is either ***liquid*** or ***solid.***
4. When the rocket is fired, this fuel is ***burnt*** out ***hot gas.***
5. Hot gas is ejected with a ***high speed*** from the nozzle of the rocket. It produces a ***huge momentum.***
6. This momentum is balanced by an ***equal*** and ***opposite*** reaction force produced in the ***combustion chamber.***
7. The equal and opposite reaction forces make the rocket ***project*** forward.
8. While in motion, the mass of the rocket ***gradually decreases,*** until the fuel is completely burnt out.
9. Since, there is no net external force acting on it, the ***linear momentum is*** conserved.
10. The mass of the rocket ***decreases*** with altitude. It increases the ***velocity*** of the rocket.
11. At one stage, it reaches a velocity which is sufficient to just ***escape*** from the gravitational pull of the earth.
12. This velocity is called ***escape*** velocity.

22. What are the uses of simple microscope? **(Sep 2020)**

- Simple microscope is used by ***watch repairers*** *and* jewellers.
- To read ***small letters clearly.***
- To observe ***parts of flower, insects*** etc.
- To observe ***finger prints*** in the field of ***forensic science.***

By Newton's second law of motion,
Force, F ∝ rate of change of momentum
F ∝ change in momentum / time

$$F \alpha \frac{mv - mu}{t}$$

$$F = \frac{km(v-u)}{t}$$

Here, k is the proportionality constant.
k = 1 in all systems of units. Hence,

$$F = \frac{m(v-u)}{t} \qquad (1.5)$$

Since, acceleration = change in velocity/ time, a= (v-u)/t.
Hence, we have **F = m × a** (1.6)
Force = mass × acceleration

ii) Which instrument is used to measure the potential difference? How will you connect it in a circuit? **(PTA-5)**

Instrument
Voltmeter

Voltmeter in a circuit
Voltmeter is connected in **parallel** to the unknown resistor.

b) i) At what speed should a source of sound move away from a stationary observer so that observer finds the apparent frequency equal to half of the original frequency? **(PTA-5)**

Solution: When the source is moving away from the stationary listener, the expression for the apparent frequency is

$$n' = \left(\frac{v}{v+v_s}\right).n$$

$$\frac{n}{2} = \left(\frac{v}{v+v_s}\right).n$$

$$V_s = V$$

ii) Calculate the frequency of visible light having wavelength 3000A° travelling in vacuum. **(PTA-5)**

Wavelength 'λ' = $3000A^0 = 3000 \times 10^{-10}$ m
Velocity of light 'C' = 3×10^8 ms^{-2}
Frequency 'V' = $\frac{C}{\lambda}$

$$= \frac{3 \times 10^8}{3000 \times 10^{-10}} \qquad \frac{3 \times 10^8}{3 \times 10^{-7}}$$

Frequency 'V' = 10^{15} Hz

iii) X- rays should not be taken often. Give the reason. **(PTA-5)**

1. X-ray radiation can ***penetrate*** deep into our body.
2. Over exposure of x-ray may lead to the ***damage*** of sensitive internal organs.

24. a) ii) Explain how the nature of reactants and concentration of reactants influence the rate of a chemical reaction. **(PTA-5)**

Nature of the Reactants

- A ***strong acid*** reacts faster.
- A ***week acid*** reacts slower.
- Hydrochloric acid is a stronger acid than acetic acid.
- The reaction of sodium with hydrochloric acid is faster than that with acetic acid.
- So, the above reactions show that the nature of the reactants influence the reaction rate.
- Example for fast reaction:

$$2Na_{(s)} + 2HCl_{(aq)} \longrightarrow 2NaCl_{(aq)} + H_{2(g)} \text{ (fast)}$$

- Example for slow reaction:

$$2Na_{(s)} + 2CH_3COOH_{(aq)} \longrightarrow 2CH_3COONa_{(aq)} + H_{2(g)} \text{ (slow)}$$

Concentration of the Reactants

- When the ***concentration*** of the reactant is ***high,*** the ***reaction rate*** is also high.
- When the concentration of the reactant is ***low***, the ***reaction rate*** is also ***low.***
- More the concentration, more particles per volume exist in it and hence faster the reaction.
- Granulated zinc reacts faster with 2M hydrochloric acid than 1M hydrochloric acid.

b) i) Calculate the solubility of a solute at 300K by dissolving 10g of solute in 50g of solvent. **(PTA-5)**

Solution:

Mass of the solute = 10g

Mass of the solvent = 50g

$$\text{Solubility of the solute} = \frac{\text{Mass of the solute}}{\text{Mass of the solvent}} \times 100$$

$$= \frac{10}{50} \times 100$$

Solubility of the solute = **20g**

ii) Explain why micelles formation take place with a diagram when soap is added to water? **(PTA-5)**

Reason for Micelle Formation

When soap is dissolved in water, the ***non-polar, hydrophobic tail*** of soap molecule ***does not dissolve in water.*** Hence micelles are formed.

Key

1. Soap is formed of ***sodium*** or ***potassium*** salts of carboxylic acid.
2. Each soap molecule has two ends namely:
   1. Hydrophilic head *2. Hydrophobic tail*

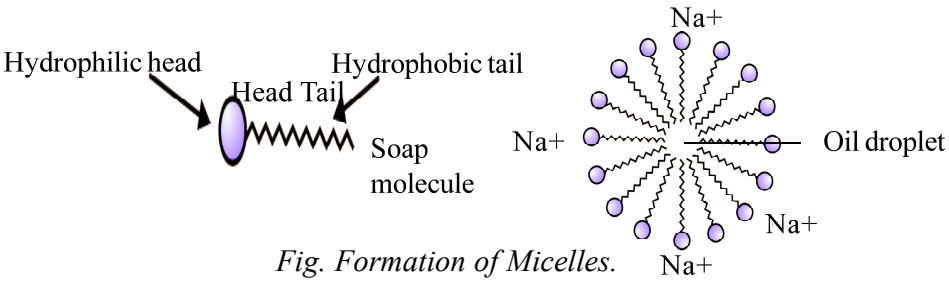


Fig. Formation of Micelles.