MOTION TALENT SEARCH EXAMINATION
SESSION - 2024-25

CLASS : 11th

QUESTION PAPER

CANDIDATE'S NAME : _____

DURATION: 60 MINUTES **TOTAL QUESTIONS: 25** **MAXIMUM MARKS : 120**

1. The paper consists of four sections :- Physics, Chemistry, Biology/Mathematics and Mental Ability.

2. All questions are compulsory and carry four marks each. One mark will be dedcuted for each wrong answer.

3. There is only one correct answer hence mark one choice only.

4. Darken your choice in OMR Sheet with Blue/ Black Ball Point Pen.

5. Return the OMR Sheet to the invigilator at the end of the exam.

PHYSICS

Comprehension/Passage (Q.1 to 3):

Inverted images of distant objects on the ground are usually seen during hot summer days. These images are seen as a result of an optical illusion called mirage. Such an illusion caused due to preceived presence of water though in reality water is non existent.

Twinkling of stars is due to atmospheric refraction. Light from stars undergoes continuous refraction as it enters the earth's atmosphere. Since the refracted ray bends towards the normal stars appear of different position and appear slightly higher than their actual positions. The apparent position of the star changes gradually due to change in the earth's atmosphere. Thus the apparent position of the star fluctuates. As a result, the path of light from the star varies. (flux entering the eye also varies).

Due to change in the light flux, star appears brighter some times and fainter at the other time. Thus the twinkling of stars is due to fluctuation of apparent position of the star.

1. A mirage takes place due to _____.

(A) reflection

(B) refraction

(C) total internal reflection

(D) Both (B) and (C)

2. Find out the incorrect statement :–

(A) mirage is an optical illusion.

(B) stars twinkles due to the reflection of light of atmosphere.

(C) The apparent position of star fluctuates.

(D) Stars appears bright & faint continuously

3. Twinkling of stars is due to :–

(A) Reflection (B) Scattering

(C) Refraction (D) All of above

Comprehension/Passage (Q.4 to 6):

Electric charge is of two types viz., postiive and negative charge.

Protone is said to be charged positively and electron is said to be charged negatively.

Like charges repel and unlike charges attract.Thus a proton repels a proton and attracts an electron. The force of attraction or repulsion between two charges is given by Coulomb's law.

$$F = \frac{Kq_1q_2}{r^2}$$

where q_1 and q_2 are charges.

K = constant of proportionality.

r = distance between the charges.

Charge can neither be created nor destroyed. The charge from one body can be transferred to another body but the total charge of a system remains constant. This is called the law of conservation of charge.

Protons and electrons are elementary charged particles. Though the charge on them is opposite in nature, the magnitude of charge possessed by them is same i.e., 1.6×10^{-19}C. Charge on a body is always an integral multiple of this value. This is called quantization of charge.

When a body gains electrons, it becomes negatively charged. When it loses electrons it becomes positively charged. The positive charge being bound firmly in the nucleus does not participate in charging.

4. What is the relation between force (F) and distance (r).

(A) $F \propto \frac{1}{r}$ (B) $F \propto r$

(C) $F \propto \frac{1}{r^2}$ (D) $F \propto r^2$

5. Charge on e^- and p^+ are
(A) same in magnitude and nature
(B) different in magnitude and same in nature
(C) same in magnitude and opposite in nature
(D) different in magnitude and opposite in nature

6. Body becomes negatively charged when it :–
(A) gains e^- (B) release e^-
(C) release p^+ (D) both (A) & (B)

CHEMISTRY

Comprehension/Passage (Q.7 to 9):

The eighteen vertical columns are different groups and each have different properties. An example of a group is the gases called noble or inert. They are lined up in the final (18^{th}) column or group of the Periodic Table. Each of these elements have a full outer shell of electrons, which mean they are very stable. When an element is stable they usually do not react to other elements. They don't mix well or easily.

A second example are the metals called alkali. They align in the first column, or group and are all very similar having only one electron in its outer shell. these elements are very reactive, meaning they easily mix with the other elements.

7. Helium is a gas and an element located in which column number of the Periodic Table?
(A) 1^{st} (B) 6^{th}
(C) 18^{th} (D) 24^{th}

8. Sodium is an element located in a group name called alkali metal and is in which column of the Period Table?
(A) 1^{st} (B) 6^{th}
(C) 18^{th} (D) 24^{th}

9. What is the difference between elements aligned in the first column versus the last column?
(A) Elements in the 1^{st} column are less reactive than elements in the last column.
(B) Elements in the last column are less reactive than elements in the 1^{st} column.
(C) Elements in the 1^{st} column are gases and elements in the last column are solids.
(D) Elements in the last column are gases and elements in the 1^{st} column are solids.

Comprehension/Passage (Q.10 to 12):

Litmus is the most commonly used natural indicator. Its natural color is purple, but when an acidic solution touches it, it will turn red. If it is dipped into a basic solution the litmus will turn blue. Litmus is made from organisms called lichens, which come from fungus and alga, and are found in the form of a paper strip or a solution used by chemists and other scientists.

A pH scale is used to indicate the number of hydrogen ions in a specific solution.

The pH scale uses a range from 1 to 14, with liquids having a pH value between 0 and 7 as being acidic. Basic score between 7 and 14 with a liquid.

A score of 7 indicates a solution is neutral meaning the hydorgen and hydroxide ions in the solution are equal, such as water.

10. Which of the following is the most commonly used indicator?
(A) Litmus (B) China rose
(C) Turmeric (D) Plants

11. If litmus comes in contact with an acidic solution, the litmus will turn which of the folloiwng color?
(A) Red (B) Blue
(C) Green (D) Yellow

12. Which of the following score on a pH scale would indicate a neutral solution?
(A) 1 (B) 14
(C) 0 (D) 7

BIOLOGY

Comprehension/Passage (Q.13 to 15):
Digestion of food begins in mouth. The food ingested is chewed by teeth and broken into smaller particles so that large surface area is provided for the action of enzymes. This food is mixed with saliva secreted by salivary glands which moistens and lubricates the food and helps in swallowing. Also the enzyme salivary amylase (ptyalin) acts on starch present in the food and breaks it into maltose, a disaccharide. The medium is alkaline or neutral.

13. In man the teeth which are replaced are _____ in number.
(A) 32 (B) 20
(C) 28 (D) 12

14. Which of the following is not a salivary gland?
(A) Lacrymal (B) Sublingual
(C) Submaxillary (D) Parotid

15. When teeth are different in shape, size and function, then these are called:
(A) thecodont (B) deciduous
(C) heterodont (D) none of these

Comprehension/Passage (Q.16 to 18):
Food acts as a fuel to provide energy to do work. It is true for all living organisms. In any given ecosystem, all living organisms are linked in a systematic chain with respect to their mode of manufacturing food/feeding habits. The sequential interlinking of organisms involving transfer of food energy from the producers, through a series of organsims with repeated eating and being eaten is called the food chain.
The various steps, representing organisms in a food chain, at which the transfer of food and energy takes place are called trophic levels.
Food web is a network of food chains which become inter-connected at various trophic levels so as to form a number of feeding connections amongst different organisms of a biotic community.

16. Food web helps in:
(A) providing alternative pathways of food availability
(B) checking the overpopulation
(C) ecosystem development
(D) All of these

17. As it travels along the food chains, the concentration of DDT:
(A) increases (B) remains constant
(C) decreases (D) fluctuates randomly

18. On an average, energy transferred from one trophic level to next trophic level is:
(A) 5% (B) 10%
(C) 15% (D) 20%

MATHEMATICS

Comprehension/Passage (Q.13 to 15):
If α and β s be the zeroes of the polynomial $ax^2 + bx + c$, then the value of:

13. $\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}}$ is:
(A) b (B) $\frac{-b}{\sqrt{ac}}$
(C) $-\frac{\sqrt{b}}{ac}$ (D) $\frac{1}{ac}$

14. $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ is:
(A) $\frac{b^2 - 2ac}{c^2}$ (B) $\frac{b^2 + 2ac}{c^2}$
(C) $b^2 - ac$ (D) $\frac{b^2 + 4ac}{c^2}$

15. $\frac{1}{\alpha} + \frac{1}{\beta}$ is:
(A) $\frac{-b}{ac}$ (B) b = ac
(C) $\frac{-b}{c}$ (D) $a\sqrt{\frac{b}{ac}}$

Comprehension/Passage (Q.16 to 18):
If h is the height, l the slant height and r_1, r_2 radii of the circualr bases of the frustum of a cone, then slant height of the frustum = $\sqrt{(r_1 - r_2)^2 + h^2}$. Height of the cone of which the frustum is a part = $\frac{hr}{r_1 - r_2}$.

16. Find the height of cone of which the bucket is a part if h = 8cm, r_1 = 9cm and r_2 = 3cm.
(A) 18 cm (B) 9 cm
(C) 11 cm (D) 12 cm

17. Find the volume of water which can be filled in the bucket.
(A) 312 π cm^3 (B) 321 π cm^3
(C) 108 π cm^3 (D) 324 π cm^3

18. Find the area of copper sheet required to make the bucket.
(A) 109 cm^2 (B) 129 π cm^2
(C) 129 cm^2 (D) 105 cm^2

MENTAL ABILITY

Comprehension/Passage (Q.19 to 21):
The following question are based on the arrangement of numbers in the form of a pyramid. In each question there is some relationship between the two numbers on the left of the (::). The same relationship exists between the two terms in the right of which one is missing. Find the missing are from the given alternatives.

1
2 3 4
9 8 7 6 5
10 11 12 13 14 15 16
25 24 23 22 21 20 19 18 17
26 27 28 29 30 31 32 33 34 35 36
49 48 47 46 45 44 43 42 41 40 39 38 37

19. 132220 : 211412 : : 222931 : (?)
(A) 304345 (B) 302123
(C) 442931 (D) 312022

20. 2873 : 13212014 : : 10242311 : (?)
(A) 29282423 (B) 28274746
(C) 25272824 (D) 29454430

21. 25224447 : 23204245 :: 11143229 : (?)
(A) 13163431 (B) 24214341
(C) 24214346 (D) 13102421

Comprehension/Passage (Q.22 to 25) :
Read the information carefully and answer the questions based on it.

(i) Eight persons E, F, G, H, I, J, K and L are seated around a square table two on each side
(ii) There are three lady members and they are not seated next to each other
(iii) J is between L and F
(iv) G is between I and F
(v) H, a lady memeber, is second to the left of J
(vi) F, a male member, is seated opposite to E, a lady member
(vii) There is a lady member between F and I

22. Who among the following are the three lady members ?
(A) E, H and J (B) E, G and J
(C) G, H and J (D) None of these

23. Who among the following is seated between E and H ?
(A) I (B) J
(C) F (D) None of these

24. Who among the following is to the immediate left of F ?
(A) G (B) J
(C) I (D) Can't be determined

25. How many persons are seated between K and F?
(A) One (B) Two
(C) Three (D) Can't be determined