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Class: 10 **Subject: Science** **Topic: OASK1510SA202** **No. of Questions: 36**

Time: 3 Hrs.   **M.M. 90**

General Instructions

1. All questions are compulsory.
2. The question paper comprises of two sections, A and B. You are to attempt both the sections.
3. Questions 1 to 3 in section A are one mark questions. These are to be answered in one word or in one sentence.
4. Questions 4 to 6 in section A are two marks questions. These are be answered in about 30 words each.
5. Questions 7 to 18 in section A are three marks questions. These are to be answered in about 50 words each.
6. Questions 19 to 24 in section A are five marks questions. These are to be answered in about 70 words each.
7. Questions 25 to 27 in sections B are 2 marks questions and Questions 28 to 36 are multiple choice questions based on practical skills. Each question of multiple choice questions is a one mark question. You are to select one most appropriate response out of the four provided to you.

SECTION – A

Q1. Name the product formed beside soap that is obtained during saponification process.

Sol. Glycerol.

Q2. What is the focal length of a lens, whose power is given as + 2.0 D?

Sol. $f = \frac{1}{P} = \frac{1}{+2.0} = +50\ cm$

Q3. In a food chain comprising lion, grass and deer, which will:

(a) Transfer the maximum amount of energy?
(b) Receive minimum amount of energy?

Sol. (a) Grass   (b) Lion

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Q4.   What discrepancies were there in Mendeleev's Periodic Table?

Sol.   (a) It was based on increasing order of atomic weight and vertical similarly in properties, but vertical similarity of properties was given preference over increasing order. Consequently some elements with higher atomic weight were placed before the elements with lower atomic weight.
(b) Isotopes were not given separate place in the periodic table although they had different atomic masses.
(c) Certain elements with similar properties were placed in separated group whereas some elements having dissimilar properties were placed in same groups.

Q5.   Mention any four details that can be inferred about organisms from their fossils.

Sol.   (a) Phylogeny can be reconstructed from fossils.
(b) The habits and behavior of extinct organism can be inferred from well preserved fossils.
(c) Some fossils indicate the connecting link between two groups of organisms.
(d) By analysis of distribution of fossils in different states of rocks, the time in history when different species were forms or become extinct can be inferred.

Q6.   Why does it take some time to see objects in dim light when you enter the room from bright sunlight outside?

Sol.   In bright sunlight, the iris contacts the pupil to allow less light to enter the eye and in dim light, the iris expands the pupil to admit more light to see the object so it takes some times to increase the size of pupil in dim light.

Q7.   What do you understand by periodicity? Are the properties of element placed in a group same? Illustrate.

Sol.   The repetition of similar properties after a definite interval of time is called periodicity of property. Yet the properties of elements placed in a group are similar e.g.
(a) Group I elements from monopositive ions. Li^+, Na^+, K^+ $etc.$
(b) Group I elements are soft metals
(c) Group I elements from basic oxides
(d) They are highly electropositive and more reactive.

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Q8.   The atomic number of an element is 16. Predict its:
   (a) valency
   (b) group number
   (c) whether it is a metal of non – metal
   (d) natural of the oxide formed
   (e) name of the element

Sol.   (a) Its valency is 2.
   (b) It belongs to group 16 of periodic table.
   (c) It is non – metal.
   (d) It forms acidic oxide
   (e) The name of element is suphur

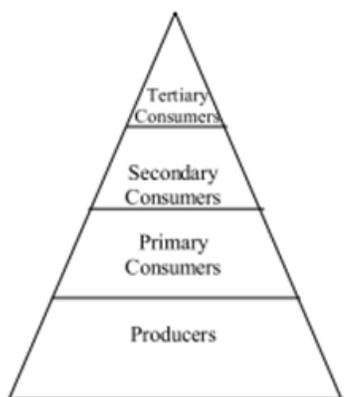Q9.   How are variant genotypes produced?

Sol.   Variant genotypes can be produced by: -
   1.   Mutation in genes and chromosomes
   2.   Recombination of genes
   3.   Hybridization of genes.

Q10.   Give the correct sequence of various trophic levels in a food chain.
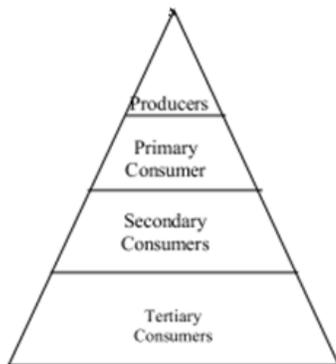
Sol.

Q11. Name any three organs homologous to human hand. Why are they considered homologous?

Sol. The three organs homologous to human hand are whale's flipper, bat's wing and cat's paw. They are considered homologous because they have a similar plan and contain approximately the same number of bones. The pattern of their embryonic development is also similar hence they are called homologous organs.

Q12. Who was Mendel? Why was he called the "Father of Genetics"?

Sol. Gregor Johann Mendel (1822 - 1884) was an Austrian genetics.
He lives as a monk from 1843. He sowed the garden pea (Pisum sativum) and found flowers of different colours. He formulated the law of heredity by his experiments. His laws gave the base for further study of genetics. Therefore he was called the "Father of Genetics"

Q13. A concave lens has the focal length of 20 cm. At what distance from the lens a 5 cm tall object be placed so that it forms an image at 15 cm from the lens? Also calculate the size of the image formed.

Sol. $f = -20 \, cm \, , h_0 = 5 \, cm \, , \; v = -15 \, cm$

$Using \; \dfrac{1}{f} = \dfrac{1}{v} - \dfrac{1}{u} \; we \; get, \quad \dfrac{1}{u} = \dfrac{1}{v} - \dfrac{1}{f} \qquad \Rightarrow \quad \dfrac{1}{u} = \dfrac{1}{-15} - \dfrac{1}{-20}$

$\Rightarrow \quad \dfrac{1}{u} = \dfrac{-20+15}{300} = \dfrac{-5}{300} \qquad \Rightarrow u = -60 \, cm$

$Since \quad m = \dfrac{h_1}{h_0} = \dfrac{v}{u} \qquad \Rightarrow \quad h_1 = \dfrac{v}{u} \times h_0 = \dfrac{(-15)}{(-60)} \times 5 \; = \dfrac{5}{4}$

$\therefore$ Image is enlarges and virtual.

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Q14.   (i) State Snell's law of reflection of light.

(ii) A transparent medium A floats on another transparent medium B. When a ray of light travels obliquely from A into B, the reflected ray bends away from the normal. Which of the two media A and B if optically denser and why?

Sol.   (i) Snell's law : The ratio of the sine of the angle of incident to the sine of the angle of refraction is constant called refractive index of the medium.

(ii) A ray will bend away from the normal only on entering a rarer medium from denser medium. So B is rarer and A is optically denser medium.
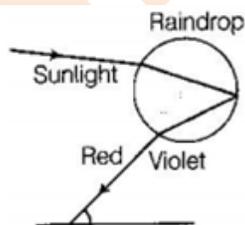
Q15.   Ramesh and his friends performed well in SA – 1. They wanted to go for outing, so they made a request to the principal in this regard. It was decided that they will go by cycle to witness the famous Ranapur water fountain show, situated nearly eight kilometers from their places, with their physical educations teacher.

It was sunny day. They all enjoyed, rejuvenated and rejoiced mind and body, Ramesh was thrilled as he saw an exciting natural spectrum appearing in the sky when he looked at the sky through the water fountain, with the sum behind him. He came back with a number of questions in his mind.

Read the given passage and answer the following questions:

(a) Name the natural spectrum appearing in the sky. How does it form?

(b) Draw a ray diagram showing formation of natural spectrum appearing in the sky.

(c) What value of shown by Ramesh

Sol.   (a) A rainbow is a natural spectrum appearing in the sky after a rain shower. A rainbow is always formed in a direction opposite to that of the sun. The water droplets act like small prisms. They disperse the white light due to which rainbow forms.

(b) A ray diagram for the formation of natural spectrum appearing in the sky:

(c) Value shown by Ramesh are faith in authority, discipline and friendship.

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Q16. How do we see colours? Explain the role of cells to respond (i) Intensity (ii) Colour.
What is colour blindness?

Sol. Colours are seen associated with an object, if it reflected that colour when light falls on it.
(a) Intensity of light is responded by the rod – shaped cells on the retina.
(b) Cones in the retina are special cells which respond and distinguish various colours.
Role: The cells generate the electrical nerve pulse.
If the person ahs less of no cone cells, then he will not be able to distinguish between the colours. This is called colour blindness.

Q17. What is the need for sign convention? Write them.

Sol. For various reflecting and refracting surfaces, the mirror and lens formula are different. To standardize it for reflection and refraction, we need sign convention. According to sign convention,
(i) All measurements should be made from pole or optical centre.
(ii) All measurements made in the direction of incident ray, will be consider + ve.
(iii) All measurement done above the principle axis are to be considered + ve.

Q18. How would you dispose the following waste?
(i) Domestic wastes like vegetable peels.
(ii) Industrial wastes l like metals cans.
(iii) Plastic material.

Sol. (i) Domestic wastes like vegetable peels can be disposed by composting.
(ii) Industrial wastes like metallic cans can be disposed by melting and recycling into solid metal once again.
(iii) Plastic material can also recycled and can be refused; for example, plastic bags, bucket etc.

Q19. An organic compound A is widely used as preservation in pickles and has a molecular formula $C_2H_4O_2$. This compound reacts with ethanol to form a sweet smelling compounds B.
(i) Identify the compounds A.
(ii) Write the chemical equation for its reaction with ethanol to form compounds B.
(iii) How can we get compounds A aback from B?
(iv) Name the process and write corresponding chemical reaction.
(v) Which gas is produced when compounds A reacts with washing soda? Write the chemical equation

Sol.   (i) Compound A is CH₃C OOH.

(ii) $CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$

(iii) A can be obtained back from B by hydrolysis in presence of base (aq. NAOH)

(iv)   The process is known as saponification.

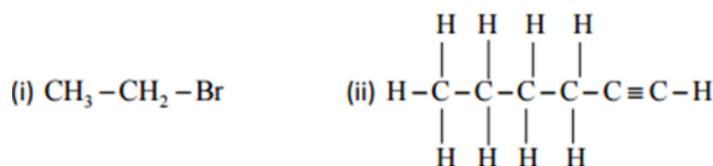$CH_3COOC_2H_5 + H_2O \xrightarrow{NaOH} CH_3COOH + C_2H_5OH$

(v)   The gas produced is CO_2 $(Carbon\ dioxide)$

$2CH_3COOH\ (l) + Na_2CO_3 \rightarrow 2CH_3COONa\ (aq) + H_2O(l) + CO_2(g)$

Or

(a) Why does carbon form largest number of compounds?

(b) Why some of these are called saturate and other unsaturated compounds?

(c) Which of these two is more reactive?
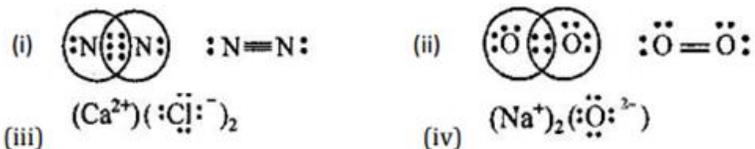
(d) Write the names of the compounds:

(i) $CH_3 - CH_2 - Br$

(ii)
$$H-\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-C\equiv C-H$$

Sol.   (a) Carbon forms large number of compounds due to its tetravalency as well as property of catenation.

(b) Those compound in which valency of carbon is satisfied by single bonds only are saturated whereas those compounds in which valency of carbon is satisfied by double or triple bonds are called unsaturated compounds.

(c) Unsaturated compound are more reactive than saturated compounds.

(d) (i) Bronoethane   (ii) Hex – 1 – yne

Q20.   (a) Draw an electron dot structure of (i) N_2 (ii) O_2 (iii) $CaCl_2$ (iv) Na_2O

(b) Write IUPAC name of (i) CH₃COCH₃ (ii) CH₃CH₂CH₂CHO

(c) How will you test the presence of carboxylic acid?

(d) Complete the following reactions:

$CH_3CH_2OH + Na \rightarrow$

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Sol. (a)

(i) $:N\!:\!:\!:\!N:$ $:N\!\equiv\!N:$ (ii) $:\ddot{O}\!:\!:\!\ddot{O}:$ $:\ddot{O}\!=\!\ddot{O}:$

(iii) $(Ca^{2+})(:\ddot{C}l:^-)_2$ (iv) $(Na^+)_2(:\ddot{O}:^{2-})$

(b) IUPAC name (i) prop none, (ii) But anal

(c) Add sodium bicarbonate sodium, if there is brisk effervescence due to evolution of CO_2, the presence of carboxylic acid is confirmed.

$$CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O + CO_2$$

(d) $2\,CH_3CH_2OH + 2Na \rightarrow 2CH_3CH_2ONa + H_2(g)$
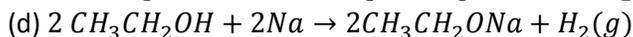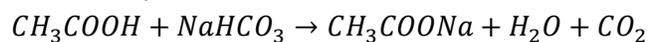
Q21. (a) What can you do as an individual to conserve water?

(b) What will be the sex of a baby if sperm carrying X chromosome fertilizes egg in human beings? Why?

Sol. (a) To conserve water I can adopt some changes in my habits while doing my routine work:

1. Using bucket for bathing instead of taking shower bath.
2. Cutting down the flow of water through tap while brushing teeth or washing face, hands, etc.
3. Waste water after washing vegetables, fruits etc. Will be used in watering plants (Any other correct reason)

(b) It will be a baby girl because fusion of gametes having X chromosomes leads to homozygous condition producing zygote with XX composition.

Q22. (a) The gene type of green stemmed tomato plants is denoted as GG and that of purple stemmed tomato plants as GG when these two are crossed.

(i) What colour of stem would you expect in F_1 progeny?

(ii) Give the percentage of purple stemmed plants if F_1 are self-pollinated.

(iii) In what ration would you find the gene type CG and Gg in the F_2 progeny?

(b) The human hand, cat paw and horse foot when studied in detail show the same structure of bones and point to towards a common origin.

(i) What do you conclude from this?

(ii) What is the term given to such structures?

Sol. (a)

(i) Colour of F_1 progeny – Green

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(ii)   Percentage of purple stemmed plants in F_2 generation ¼ or 25%

(iii)   Ratio of genotypes GG and Gg 1 : 2

(b) They have common ancestry (I) Homologous organs

Q23.   A square wire of side 3.0 cm is placed 25 cm away from a concave mirror of focal length 10 cm. What is the area enclosed by the image of the wire? The centre of the wire is on the axis of the mirror, with its two sides normal to the axis.

Sol.

For concave mirror, $u = -25$ cm, $f = -10$ cm, side of square = 3 cm,

From mirror equation, $\dfrac{1}{f} = \dfrac{1}{u} + \dfrac{1}{v}$ $\Rightarrow$ $\dfrac{1}{v} = \dfrac{1}{f} - \dfrac{1}{u} = \dfrac{1}{-10} - \dfrac{1}{-25} = \dfrac{-3}{50}$

$\therefore v = \dfrac{-50}{3} = -16.67$ cm

Therefore the image of the square wire us formed on the same side of object at 16.6 cm.

Also Magnification $(m) = \dfrac{-v}{u} = \dfrac{(-50/3)}{-25} = \dfrac{-2}{3}$

$\therefore$ Size of image of one side of square.

$$h_i = 3 \times \dfrac{2}{3} = 2 \text{ cm}$$

Image in inverted.

Area enclosed by the image of wire = (Size of image)^2 = 2^2 = 4.0 cm^2

Or

For a concave mirror, $u = -27$ cm, R = -36 cm, $h = 2.5$ cm

From mirror equation, $\dfrac{1}{v} = \dfrac{1}{f} - \dfrac{1}{u} = \dfrac{1}{R/2} - \dfrac{1}{u} = \dfrac{2}{R} - \dfrac{1}{u} = \dfrac{2}{-36} - \dfrac{1}{-27} = \dfrac{-1}{54}$

$\therefore v = -54$ cm

Also Magnification $(m) = \dfrac{h'}{h} = \dfrac{-v}{u}$ $\Rightarrow$ $\dfrac{h'}{2.5} = -\dfrac{-54}{-27}$ $\Rightarrow$ $h' = -5.0$ cm

$\therefore$ Screen should be placed at 54 cm on the same side of object in order to receive a sharp image.

The image is real, inverted, magnified having the size of 5.0 cm. We know that if the object distance decreases, the image distance will increase. SO if the candle is moved closer to the mirror, the position of image increases continuously. If the candle is placed at the focus of a concave mirror, i.e. at 18.0 cm, the image is formed at infinity and if the candle moves further towards the pole, i.e. between the pole and the focus, the image gets virtual, erect, magnified and can't be obtained on the screen.

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Q24.   Draw a labeled diagram of human eye and explain the image formation.
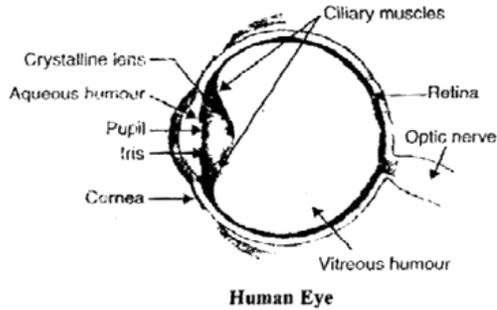
Sol.

Human Eye

Image formation: Light enters through a thin membrane called cornea. The lens made up of cornea and aqueous humour do refract the light and forms image on the light – sensitive screen called retina. The iris, a dark muscular portion controls and the size of the pupil. It becomes very small on very bright light and opens up on dim light. The retina has rods and cones as two cells. The rods responds to the intensity of light and the cones respond to the colour.

Or

What is cause for (i) Myopia and (ii) Hypermetropia show the defective eye and explain how it is corrected?
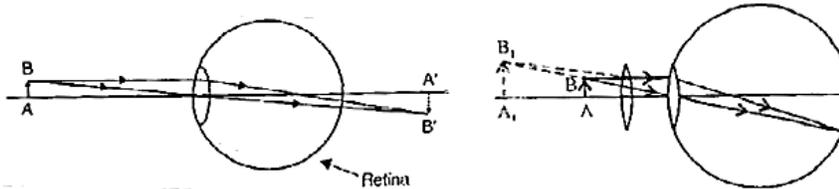
Sol.

(i) Cause for Myopia: Excessive curvature of the cornea or the elongation of the eye-ball.
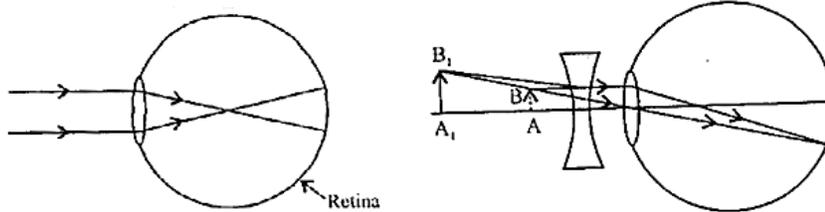
It is corrected by concave lens of suitable focal lens.

(ii) Cause for Hypermetropia: The focal length of the lens becomes too short and so nearby objects cannot be seen clearly. The eye-ball may become too short.


It is correct by the convex lens of suitable focal length.

SECTION – B

Q25. (i) Which of the following reagents gives brisk effervescence with ethanoic acid and why?
(a) Calcium hydroxide
(b) Sodium chloride
(c) Sodium bicarbonate
(d) Ammonium chloride

Sol. (c)
Sodium bicarbonate reacts with ethanoic to give brisk effervescence due to evolution of CO_2.

(ii) Write the chemical equation

Sol. $NaHCO_3 + CH_3COOH \rightarrow CH_3COONa + H_2O + CO_2 \uparrow$
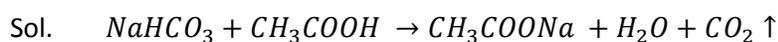
Q26. (i) A student observed a slide of yeast under a microscope and saw collection of cells in different part of the slide marked A, B, C and D as shown below:
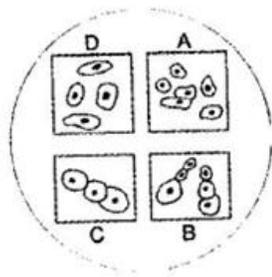
(ii) Justify your answer

Q27. (a) Given below are few steps (not in proper sequence) followed in the determination of focal length of a given convex lens by obtaining a sharp image of a distant object:
(i) Measure the distance between the lens and screen.
(ii) Adjust the position of the lens to form a sharp image.
(iii) Select a suitable distance object
(iv) Hold the lens between the object and the screen with its faces parallel to the screen
Write the correct sequences of steps for determination of focal length.
(b) Justify your answer.

Sol. (a) The correct sequence is (iii), (iv), (ii), (i)
(b) unless an object is chosen and setting of lens and screen in proper, image distance and thereby the focal length cannot be found.

Q28. A student is asked to add a tea spoon full of solid sodium bicarbonate to a test tube containing approximately 3 mL of acetic acid. He observed that the solid sodium bicarbonate:

(a) Floats on the surface of acetic acid

(b) Remains suspended in the acetic acid

(c) Settle down in the test tube.

(d) Reacts with acetic acid and a clear solution is obtained.

Sol. (d)

Q29. Sodium bicarbonate solution is added to dilute ethanoic acid. It is observed that:

(a) A gas evolves.

(b) A solid settle at the bottom

(c) The mixture becomes warm

(d) The colour of the mixture becomes light yellow.

Sol. (a)

Q30. Types of reproduction are:

(a) Asexual

(b) Sexual

(c) Cloning

(d) All of these

Sol. (d)

Q31. Which of the following organism shows budding?

(a) Spirogyra

(b) Hydra

(c) Amoeba

(d) Paramecium

Sol. (b)

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Q32.   A male child will be born if:
(a) Father is healthy
(b) Mother is well fed during pregnancy.
(c) Genetic composition of child has XY set of chromosomes
(d) Genetic composition of child has XX set of chromosomes

Sol.   (c)

Q33.   The outgrowth of hydra is termed as:
(a) Bulb
(b) Bud
(c) Daughter hydra
(d) Tentacles

Sol.   (b)

Q34.   The light from a distant object on passing through the convex lens (f – focal length):
(a) Converges at focus (f)
(b) Appears to diverge from focus
(c) Converges at 2f.
(d) Appears to diverge from 2f.

Sol.   (a)

Q35.   When red, blue and green light coming parallel to principle axis fall on a convex lens, they will converge on the axis at:
(a) One point
(b) Two points
(c) Three points
(d) Always at one point

Sol.   (c)

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Q36.   The correct formula to calculate the percentage of water absorbed by raisins is :

(a) $\frac{W_2 - W - 1}{W_1} = 100$

(b) $\frac{W_1 - W_2}{W_2} = 100$

(c) $\frac{W_1}{W_2 - W_1} = 100$

(d) $\frac{W_2}{W_2 - W_1} = 100$

Sol.   (a)