

CCE SAMPLE QUESTION PAPER 1**SECOND TERM (SA-II)****SCIENCE (Theory)****(With Solutions)****CLASS X**

Time Allowed : 3 Hours]

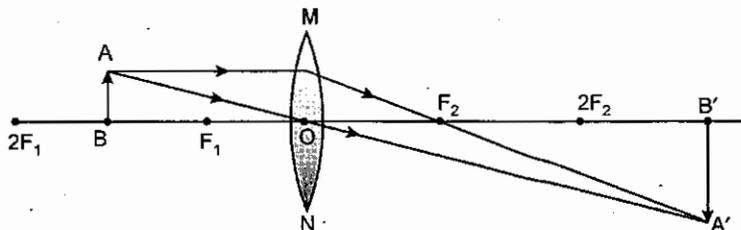
[Maximum Marks : 90

General Instructions :

- (i) The question paper comprises of two Sections, A and B, you are to attempt both the Sections.
- (ii) All questions are compulsory.
- (iii) All questions of Section A and all questions of Section B are to be attempted separately.
- (iv) Question numbers 1 to 3 in Section A are one mark questions. These are to be answered in one word or one sentence.
- (v) Question numbers 4 to 7 are two marks questions, to be answered in about 30 words.
- (vi) Question numbers 8 to 19 are three marks questions, to be answered in about 50 words.
- (vii) Question numbers 20 to 24 are five marks questions, to be answered in about 70 words.
- (viii) Question numbers 25 to 42 in Section B are multiple choice questions based on practical skills. Each question is a one mark question. You are to choose one most appropriate response out of the four provided to you.

SECTION A**Q.1. Write in one word about the following :****(i) mirrors used by dentists to examine teeth.****(ii) the smallest distance at which the eye can see objects clearly without strain. (1)****Ans. (i) concave mirror (ii) 25 cm.****Q.2. Find the period and group of the element whose atomic number is 12. (1)****Ans. The electronic configuration of the element is 2, 8, 2.****Thus, the period is 3 and the group is 2.****Q.3. What is organic evolution ? (1)****Ans. Organic evolution is a process by which new species develop from earlier forms.****Q.4. What is meant by power of accommodation of the eye ? How is it related to the focal length of the eye lens ? (2)****Ans. The ability of the eye lens to adjust its focal length so as to clearly focus light rays coming from distant as well as near objects on the retina is called the power of accommodation of the eye. When eye is viewing a distant object, focal length of eye lens is more. However, when one look at a nearby object the curvature of eye lens increases and its focal length decreases so as to form sharp image of object at the retina.****(A-1)**

Q.5. Study the ray diagram given below and answer the following questions :



- (i) State the type of lens used in the figure.
- (ii) List two properties of the image formed.
- (iii) In which position of the object will the magnification be -1 ? (2)

Ans. (i) The lens used is a convex (converging) lens.

(ii) The image formed is real, inverted and magnified.

(iii) Magnification shall be -1 when the object is situated at $2F_1$.

Q.6. What is biological magnification ? Will the levels of this magnification be different at different levels of the ecosystem ? (2)

Ans. The phenomenon of progressive increase in concentration of certain harmful non-biodegradable chemicals such as DDT at different levels of food chain is called biological magnification or biomagnifications.

The concentration of harmful chemicals will be different at different trophic levels. It will be lowest in the first trophic level and highest in the last trophic level of the food chain.

Q.7. Write any two differences between binary fission and multiple fission in a tabular form as observed in cell of organisms. (2)

Ans.

Binary fission	Multiple fission
(i) The unicellular organism splits into two equal daughter cells by cell division.	(i) Unicellular organisms divide into many daughter cells.
(ii) Nucleus and cytoplasm divide simultaneously.	(ii) First the nucleus divides into many nuclei and then each nuclei is surrounded by cytoplasm and the daughter nuclei are released by rupture of parent cell.
(iii) Many different patterns of division transverse and longitudinal. Example : Amoeba.	(iii) No definite pattern of division. Example : Malarial parasite.

Q.8. An object 2.0 cm high is placed 20.0 cm in front of a concave mirror of focal length 10.0 cm. Find the distance from the mirror at which a screen should be placed in order to obtain a sharp image. What will be the size and nature of the image formed ? (3)

Ans. Here $h = 2.0$ cm, $u = -20.0$ cm and $f = -10.0$ cm.

$$\therefore \frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{(-10)} - \frac{1}{(-20)} = \frac{-1}{10} + \frac{1}{20} = -\frac{1}{20}$$

$\Rightarrow v = -20$ cm
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Thus, distance of screen from the mirror should be 20 cm.

$$\text{Again } \frac{h'}{h} = -\frac{v}{u}$$

$$\Rightarrow h' = -\frac{v}{u}h = -\frac{(-20)}{(-20)} \times 2.0 = -2.0 \text{ cm}$$

Hence, the image is of length 2.0 cm. The $-ve$ sign of v and h' show that the image is real and inverted image.

Q.9. Define, 'refractive index of a transparent medium'. What is its unit ? Which has a higher refractive index, glass or water ? (3)

Ans. The refractive index n of a transparent medium is defined as :

$$n = \frac{\text{Speed of light in vacuum } (c)}{\text{Speed of light in given medium } (v)}$$

Refractive index is a unitless term.

Glass has a higher refractive index $\left(n_g = \frac{3}{2}\right)$ than that of water $\left(n_w = \frac{4}{3}\right)$.

Q.10. Explain why the planets do not twinkle but the stars twinkle. (3)

Ans. Stars are very far away, and behave as almost point sources of light. On account of atmospheric refraction, the path of rays of light coming from a star goes on varying slightly, the apparent position of the star fluctuates and the amount of starlight entering the eye flickers. So, sometimes, the star appears brighter and at some other time, fainter. Thus, the stars twinkle.

Planets are much closer to the earth and are seen as extended source. So, a planet may be considered as a collection of a large number of point-sized light sources. Although light coming from individual point-sized sources flickers but the total amount of light entering our eye from all the individual point-sized sources average out to be constant. Thereby, planets appear equally bright and there is no twinkling of planets.

Q.11. (a) What is meant by 'power of a lens' ? Name its SI unit.

(b) A convex lens of focal length 25 cm and a concave lens of focal length 10 cm are placed in close contact with each other. Calculate the lens power of this combination. (3)

Ans. (a) The power (P) of a lens is defined as the reciprocal of its focal length (f). Thus,

$$\text{power } P = \frac{1}{f}$$

SI unit of power of a lens is 1 dioptre.

(b) Focal length of convex lens $f_1 = + 25 \text{ cm} = 0.25 \text{ m}$

$$\therefore \text{Power of convex lens } P_1 = \frac{1}{f_1 \text{ in m}} = \frac{1}{0.25 \text{ m}} = + 4.0 \text{ D}$$

Again focal length of concave lens $f_2 = - 10 \text{ cm} = - 0.10 \text{ m}$

$$\therefore \text{Power of concave lens } P_2 = \frac{1}{f_2 \text{ in m}} = \frac{1}{(-0.10) \text{ m}} = - 10.0 \text{ D}$$

$$\therefore \text{Power of the lens combination } P = P_1 + P_2 = + 4.0 - 10.0 = - 6.0 \text{ D}$$

Q.12. Two elements with symbol X (atomic no. 11) and Y (atomic no. 13) are placed in the 3rd period of modern periodic table.

- (i) Which amongst the two has more metallic character ?
 (ii) Calculate the valency of each element.
 (iii) Element Y is smaller than X in terms of atomic size. Is the statement true ? Justify. (3)

Ans. (i) An element which has greater tendency to lose the electrons is more metallic. Element X has greater tendency to lose the electron compared to Y. As we move from left to right in a period, nuclear charge acting on the electrons increases, therefore, tendency to lose electrons decreases. Hence, X has more metallic character.

(ii) The electronic configuration of X is 2, 8, 1 and that of Y is 2, 8, 3. Therefore
 valency of X = 1
 valency of Y = 3

(iii) A greater nuclear charge is acting on Y. The nucleus pulls the electrons towards itself reducing the size of the atom. Thus, element Y is smaller than X in terms of atomic size.

Q.13. (a) Name the compound $\text{CH}_3\text{CH}_2\text{OH}$ and identify the functional group.

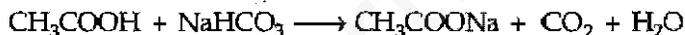
(b) Give a chemical test to distinguish between ethanol and ethanoic acid.

(c) Name the product formed when an organic acid reacts with an alcohol in the presence of an acid catalyst. (3)

Ans. (a) Name of the compound is ethanol.

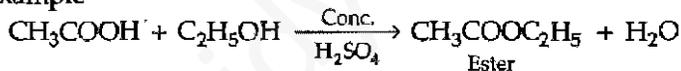
The functional group is - OH (alcoholic group).

(b) Ethanoic acid produces a brisk effervescence of carbon dioxide on adding sodium hydrogencarbonate.



Ethanol does not give this test.

(c) Ester is formed when an organic acid reacts with an alcohol in the presence of an acid catalyst. For example



Q.14. Distinguish between biodegradable and non-biodegradable substances. List two effects of each of them on the environment. (3)

Ans. **Biodegradable substances :** Substances which can be broken down by microorganisms like bacteria and fungi are called biodegradable substances. For example, paper, vegetable and fruit peels, human excreta.

Non-biodegradable substances : Substances that cannot be broken down by microorganism into simpler and harmless substances are called non-biodegradable substances. For example, polythene bags, aluminium cans, DDT, etc.

Effects of biodegradable substances : (i) They produce foul smell causing air pollution. If thrown in water, it will cause water pollution.

(ii) They serve as breeding ground for flies and mosquitoes which are carriers of diseases like cholera, typhoid and malaria.

Effects of non-biodegradable substances : (i) Non-biodegradable pesticides and fertilizers run off with rain water to water bodies and cause water pollution and affect the soil making it acidic or alkaline.

(ii) Some of the non-biodegradable pesticides enter the food chain and affect badly humans and other living organisms.

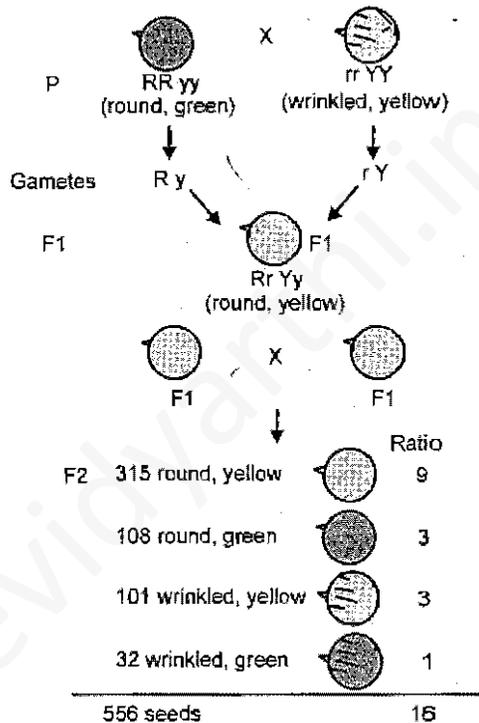
Q.15. What changes would you suggest in your home in order to be environmental friendly? (3)

Ans. We shall follow the rule of three R's :

- (i) **Reduce** : Use natural resources in limited quantity avoiding wastage.
- (ii) **Recycle** : Recycle plastic, paper, glass and metals for further use so that there is no drain on natural resources.
- (iii) **Reuse** : Envelopes can be reversed for reuse. Bottles and cans supplied with pickles, jams and squashes can be reused for storing kitchen items.

Q.16. Explain how equal genetic contribution of male and female parents is ensured in the progeny. (3)

Ans.



If progeny plants would have inherited a single whole set of gene from each parent then the experiment given cannot work. This is because the two characteristics 'R' and 'y' would then be linked to each other and cannot be independently inherited. Thus each cell will have two copies of each chromosome, one each from the male and female parents. This is insured during gamete formation. In this cross when progeny of F1 which is having round yellow seed is self-fertilised in F2 plant which express all the four traits are produced. It proves that male and female parents contribute equal genetic material.

Q.17. Explain with examples how the following are evidences in favour of evolution in organisms.

- (i) **Homologous organs**
- (ii) **Analogous organs**
- (iii) **Fossils**

(3)

Ans. Evidences in favour of evolution are :

(i) **Homologous organs** : Such organs which perform different functions but have similar structure and origin are called homologous organs. For example, wings of a bird, forelimb of man and frog perform different functions, but have similar internal structure. Presence of such organs indicate that all these vertebrates had common ancestors.

(ii) **Analogous organs** : Such organs which perform similar functions but are structurally different are called analogous organs. For example, wings of a bird and wing of an insect. Presence of such organs show that these organisms have different origin.

(iii) **Evidences from fossils** : Archaeopteryx a fossil looks like a bird, but it bears features which are found in reptiles. This shows that birds have been evolved from reptiles.

Q.18. Why is DNA copying an essential part of the process of reproduction ? (3)

Ans. DNA contains information for inheritance of features from parents to next generation. DNA present in the cell nucleus is the information source for making proteins. If the information is different, different proteins will be made. Different proteins will eventually lead to altered body designs.

Q.19. In human beings there are only 23 pairs of chromosomes but there are unlimited characteristic features. Justify. (3)

Ans. There are only 23 pairs of chromosomes in human beings but 30,000 to 40,000 number of genes. These genes are responsible for the characteristic features. That is why there is so much of variation in the characteristic features.

Q.20. Sania and Shreya are best friends and study in grade 4. Recently, Sania has been facing difficulty in reading the blackboard text from the last desk. Shreya is little uncomfortable and wonders why Sania avoids sitting on the last desk. On observation she found that Sania often carries junk food in her lunch. Shreya has started sharing her lunch – full of green vegetables and fruits with her. Sania is now better and has also started taking a 'balance diet'.

(i) Name the eye defect Sania is suffering from.

(ii) What are the two possible deformities related to her eye defect ?

(iii) What value is shown by Shreya and Sania ? [Value Based Question] (5)

Ans. (i) Sania is suffering from Myopia or nearsightedness defect of eye.

(ii) Two possible deformities related to her eye defect are :

(a) Lens defect – The curvature of cornea of eye is more so that focal length of eye lens is less.

(b) Eyeball defect – The size of the eyeball is more i.e., the eyeball has been elongated.

(iii) Shreya and Sania show friendship, concern and welfare of each other and mutual help. They care for their health and take balance diet.

Q.21. (a) How many elements are known till date ?

(b) List the triads that Döbereiner could identify ?

(c) Which scientist believed that no more elements will be discovered in future ?

(d) What was the nationality of Mendeléev ? In which year was his Periodic Table published ?

(e) How many periods and groups are there in the Modern Periodic Table ? (5)

Ans. (a) 114 elements are known till date.

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(b) Triads identified by Döbereiner are :

Li	Ca	Cl
Na	Sr	Br
K	Ba	I

(c) John Newlands.

(d) Mendeléev was a Russian. His Periodic Table was published in the year 1872.

(e) There are 7 periods and 18 groups in the Modern Periodic Table.

Or

(a) Name first three members of group 2 and 16.

(b) Name any four metalloids.

(c) Which chemical properties were stressed by Mendeléev while formulating his Periodic Table ?

(d) Write the following elements in order of increasing atomic numbers :

Magnesium, Lithium, Aluminium.

(e) Give the electronic configuration of the following elements :

Carbon, Phosphorus, Chlorine.

Ans. (a) First three members of group 2 are Be, Mg and Ca.

First three members of group 16 are O, S and Se.

(b) Boron, silicon, germanium and arsenic are metalloids.

(c) Formulae of hydrides and oxides formed by the elements.

(d) Lithium < Magnesium < Aluminium

(e) Carbon : 2, 4

Phosphorus : 2, 8, 5

Chlorine : 2, 8, 7

Q.22. (a) In a tabular form, differentiate between ethanol and ethanoic acid under the following heads :

(i) Physical state

(ii) Taste

(iii) NaHCO₃ test

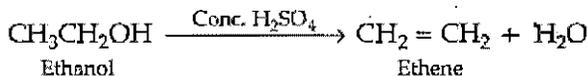
(iv) Ester test

(b) Write a chemical reaction to show the dehydration of ethanol. (5)

Ans. (a) Difference between ethanol and ethanoic acid under the following heads in a tabular form are :

Property	Ethanol	Ethanoic acid
(i) Physical state	Liquid.	Liquid.
(ii) Taste	Burning taste.	Sour taste.
(iii) NaHCO ₃ test	No reaction.	Carbon dioxide is evolved $\text{CH}_3\text{COOH} + \text{NaHCO}_3 \longrightarrow$ $\text{CH}_3\text{COONa} + \text{CO}_2 + \text{H}_2\text{O}$
(iv) Ester test	Ethanol reacts with ethanoic acid to form the ester $\text{C}_2\text{H}_5\text{OH} + \text{CH}_3\text{COOH} \xrightarrow{\text{Acid}}$ $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$	Ethanoic acid reacts with alcohol to form the ester. $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \xrightarrow{\text{Acid}}$ $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$

(b) The chemical reaction to show the dehydration of ethanol :



Or

(a) What is a soap ? Why are soaps not suitable for washing clothes when the water is hard ?

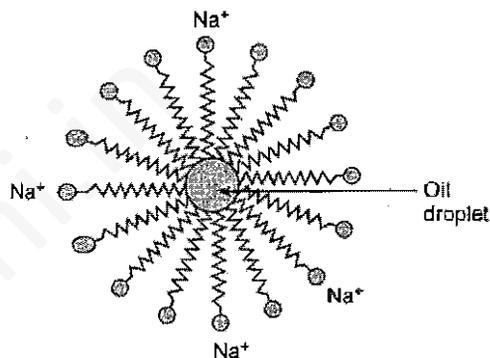
(b) Explain the action of soap in removing an oily spot from a piece of cloth.

Ans. (a) Molecules of soap are sodium or potassium salts of long-chain carboxylic acids.

Soaps are not suitable for washing clothes when the water is hard. This is because hard water contains salts of calcium and magnesium. Soap reacts with these salts to form insoluble scum, for example, calcium stearate and magnesium stearate. These scums offer a hurdle in the washing of clothes.

(b) The cleansing action of soap can be explained as under :

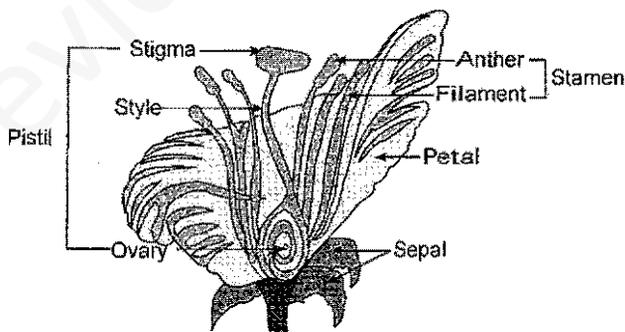
The ionic-end of soap molecule dissolves in water while the hydrocarbon chain dissolves in oil. The soap molecules thus form a structure known as micelles (see figure), where one end of the soap molecule is towards the oil droplet while the ionic-end faces outside the cloth. This forms an emulsion in water. The soap micelles thus help in dissolving the dirt in water and we can wash our clothes.



Q.23. (a) Draw a diagram of the longitudinal section of a flower and label on it sepal, petal, ovary and stigma.

(b) Write the names of male and female reproductive parts of a flower. (5)

Ans. (a)



Longitudinal section of flower

(b) Male – Stamen

Female – Carpel or pistil

Or

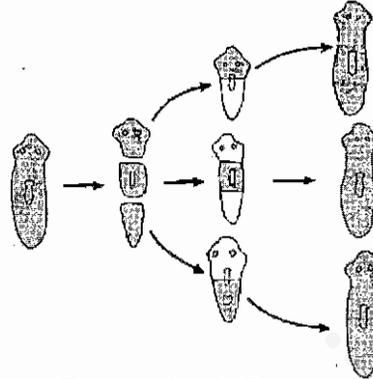
(a) What is fragmentation in organisms ? Name a multicellular organism which reproduces by this method.

(b) What is regeneration in organism ? Describe regeneration in Planaria with the help of a suitable diagram.

Ans. (a) Fragmentation is the ability of an organism to reconstruct its lost body parts from a fragment (piece) of body. When a mature *Spirogyra* breaks into two or more pieces, these pieces grow into new individuals. This process is called fragmentation.

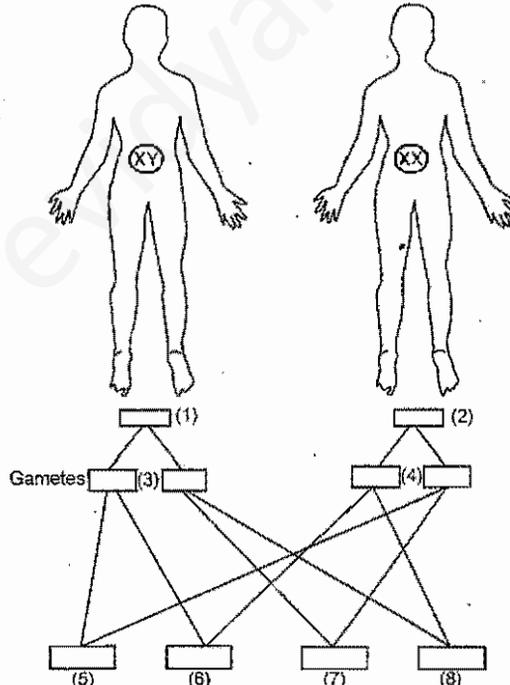
(b) Regeneration is the ability of an organism to replace its lost body parts or to form a complete organism from a part of the body.

Animals like *Hydra*, *Planaria* and sponges also show regeneration. If *Planaria* is cut into pieces, each piece develops into a complete individual.



Regeneration in Planaria

Q.24. Identify male and female in the figures given below. Also fill in the blanks 3 to 8 and then clarify about the misconception that mother and not father is responsible for bearing daughters and not sons. (5)



Ans. (1) Male (2) Female (3) X and Y (4) X and X (5) XY (6) XX (7) XY (8) XY.

A child who inherits 'X' chromosome from father will be a girl and the child who inherits 'Y' chromosome from father will be a boy, i.e., human male is heterogamous while females are homogamous.

Or

(a) A man with blood group A marries a woman with blood group O and their daughter has blood group O. Is this information enough to tell you which of the traits — blood group A or O is dominant? Why?

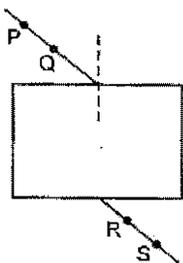
(b) "Only variations that confer an advantage to an individual organism will survive in a population." Comment on the statement.

Ans. (a) This information is not enough to tell us which of the trait A or O blood group is dominant. The blood group is determined by a pair of gene. In this case the child inherited gene coding for O group from mother as well as father. [The father is having AO genotype and mother OO genotype.]

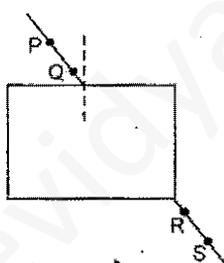
(b) Depending on the nature of variations different individuals would have different kinds of advantages. In a population of bacteria that can withstand heat will survive better in a heat wave condition while those which do not have such variation will be eliminated. Hence, it is true that "Only variations that confer an advantage to an individual organism will survive in a population".

SECTION B

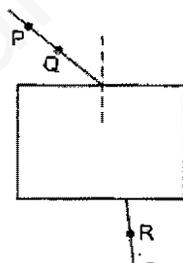
Q.25. Four students A, B, C and D traced the path of a ray of light passing through a glass slab placed in air. Their observations about incident and emergent ray were recorded as given below :



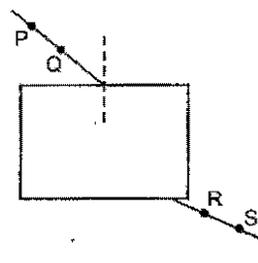
(A)



(B)



(C)



(D)

The student who made the correct observation is :

(a) A

(b) B

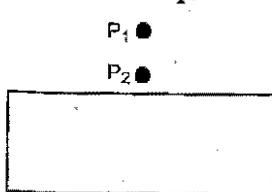
(c) C

(d) D

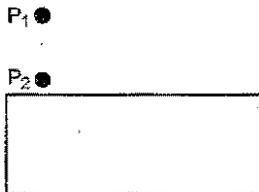
(1)

Ans. (a) A.

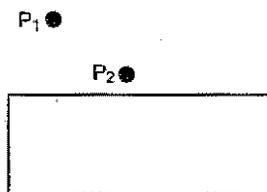
Q.26. While tracing the path of a ray of light passing from air through a rectangular glass slab, the setup, in which the best result will be obtained is : (1)



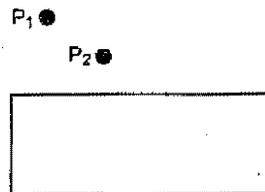
(A)



(B)



(C)



(D)

(a) A

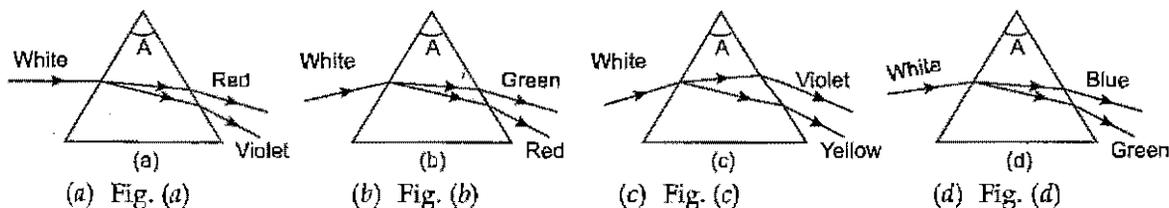
(b) B

(c) C

(d) D

Ans. (c) C.

Q.31. Choose the correct depiction for dispersion of white light on passing through a prism. (1)



Ans. (a) Fig. (a) gives the correct depiction for dispersion of light on passing through a prism.

Q.32. Acetic acid was added to four test tubes containing the following chemicals :

- | | |
|----------------------|---------------------------|
| (i) Sodium carbonate | (ii) Blue litmus solution |
| (iii) Lime water | (iv) Distilled water |

Which amongst these is/are correct option(s) for carrying out a characteristic test for identification of a carboxylic acid (acetic acid) in the laboratory ? (1)

- | | |
|------------------|--------------------|
| (a) (i) only | (b) (ii) only |
| (c) (i) and (ii) | (d) (iii) and (iv) |

Ans. (c) Organic acids react with sodium carbonate to liberate carbon dioxide. Also acids turn blue litmus red.

Q.33. A student while observing the properties of acetic acid would report that this acid smells like (1)

- | | |
|--|---|
| (a) vinegar and turns red litmus blue. | (b) rotten egg and turns red litmus blue. |
| (c) vinegar and turns blue litmus red. | (d) rotten egg and turns blue litmus red. |

Ans. (c) Acetic acid smells like vinegar and like any other acid would turn blue litmus red.

Q.34. What will you observe after the saponification reaction is complete in a vessel ?(1)

- Blue litmus paper changes into red.
- Red litmus paper changes into blue.
- Both the blue and the red litmus papers are bleached.
- Neither of them is affected.

Ans. (b) After the saponification reaction is complete, there is slight excess of sodium hydroxide. Therefore, red litmus paper changes into blue.

Q.35. Which of the following cannot be used for the preparation of soap ? (1)

- | | |
|-------------------|-----------------|
| (a) Castor oil | (b) Mobil oil |
| (c) Groundnut oil | (d) Linseed oil |

Ans. (b) Mobil oil is a mineral oil. It is not glyceryl ester of fatty acids. Hence, we cannot get soap from mobil oil.

Q.36. Tick the correct statement : (1)

- More foam is formed by hard water than soft water.
- More foam is formed by soft water than hard water.
- Hardness of water is due to the presence of calcium hydrogencarbonate only.
- Greater the amount of calcium sulphate in water, greater will be the cleansing capacity of soap.

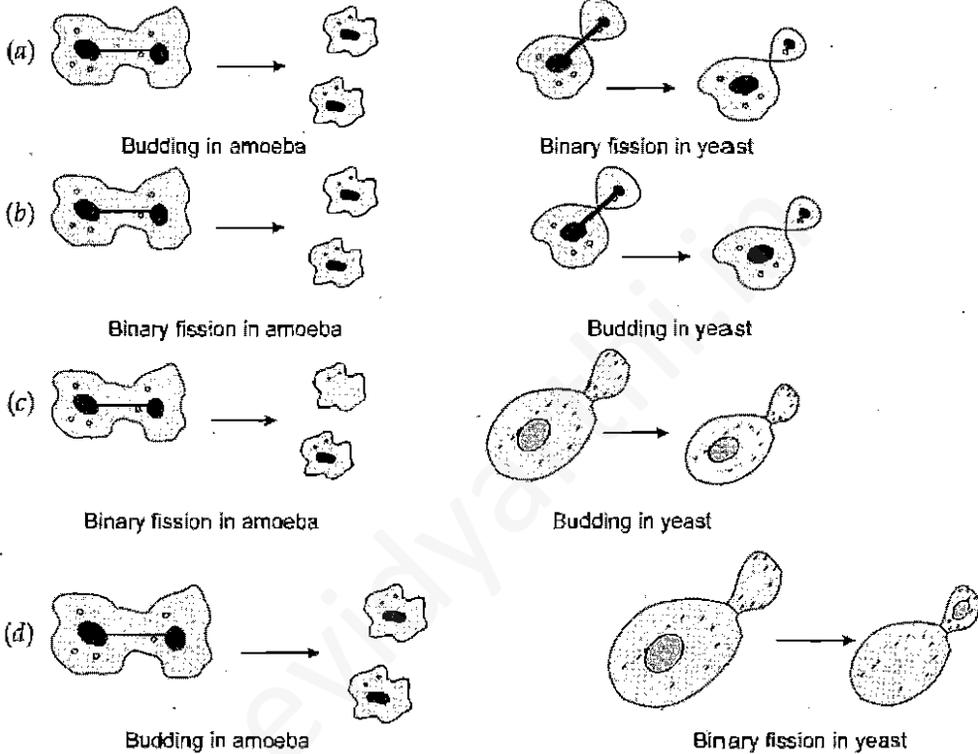
Ans. (b) Only this statement is correct. Statements (a), (c) and (d) are wrong statements.

Q.37. Which of the following do you think will give the maximum foam ? (1)

- (a) Aqua-guarded water (b) Distilled water
(c) Water from the river (d) Sea water

Ans. (b) Sea water contains maximum salts followed by river water. Aqua-guarded water contains traces of salt for taste. Distilled water is completely free from salts. Therefore, it gives the maximum foam.

Q.38. Which one out of the following sets of diagrams correctly depicts reproduction in amoeba and yeast ? (1)



Ans. (b) Self explanatory.

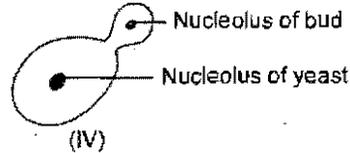
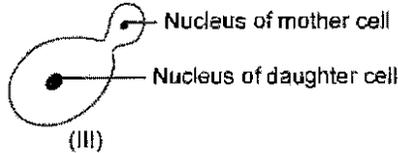
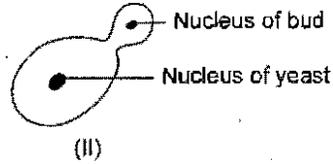
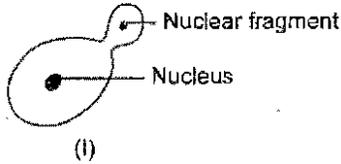
Q.39. Given below are the stages of Binary fission in amoeba. Which one out of the following would you select as the correct sequence of these stages ? (1)



- (a) A, B, C, D (b) D, C, A, B
(c) B, D, A, C (d) C, A, D, B

Ans. (c) Self explanatory.

Q.40. Out of the given diagrams, the correctly labelled diagram showing budding in yeast is : (1)



(a) I

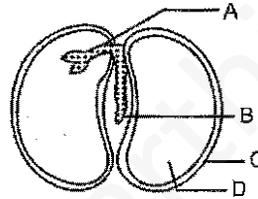
(b) II

(c) III

(d) IV

Ans. (b) Diagram (II) shows the correct labelling.

Q.41. A student draws the adjacent diagram of dicot seed but could not label the parts marked as A, B, C and D. The correct labelling of these parts respectively are (1)



- (a) Radicle, Plumule, Seed coat, Cotyledons
- (b) Plumule, Radicle, Seed coat, Cotyledon
- (c) Radicle, Plumule, Cotyledon, Seed coat
- (d) Plumule, Radicle, Cotyledon, Seed coat

Ans. (b) This is the correct labelling.

Q.42. Wings of an insect and wings of a bird are the examples of (1)

- (a) Analogous organs
- (b) Homologous organs
- (c) Atavism
- (d) Vestigial organs

Ans. (a) These are analogous organs.