CBSE Sample Paper-03
SUMMATIVE ASSESSMENT –II
SCIENCE (Theory)
Class – X

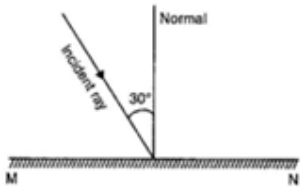
Time allowed: 3 hours Maximum Marks: 90

General Instructions:

a) All questions are compulsory.
b) The question paper comprises of two sections, A and B. You are to attempt both the sections.
c) Questions 1 to 3 in section A are one mark questions. These are to be answered in one word or in one sentence.
d) Questions 4 to 6 in section A are two marks questions. These are to be answered in about 30 words each.
e) Questions 7 to 18 in section A are three marks questions. These are to be answered in about 50 words each.
f) Questions 19 to 24 in section A are five marks questions. These are to be answered in about 70 words each.
g) Questions 25 to 27 in section 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

1. Figure below shows an incident ray and normal on a plane mirror MN. Draw the reflected ray and find the angle between the incident ray and reflected ray.



2. Name any two biodegradable pollutants.
3. Define soaps?
4. Why is water necessary for living organisms?
5. With respect to air, the refractive index of ice is 1.31 and that of rock salt is 1.54. Calculate the refractive index of rock salt with respect to ice.
6. Why is K more reactive than Li?
7. A convex mirror used on a bus has a focal length of 200 cm. If a scooter is located at 100 cm. from this mirror find the position, nature and magnification of the image formed in the mirror.
8. (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?
9. What is the need for sign convention? Write them.

10. What are optical fibres? Give three applications of these fibres.
11. Suggest three ways to maintain a balance between environment and development to survive.
12. DDT that was sprayed in minute amount on food plants was detected in high concentration in man? How did it happen? Explain.
13. Give three drawbacks (limitations) of Mendeleev's Periodic Table.
14. Sheeba studies in grade 9 and is a secretary of school's club. As per practice in the school, all members of science club assemble in Physics lab in last two periods on every Friday.
    Sheeba also extends help to her mother in kitchen. One day she observed that the apparent random wavering or flickering of objects seen through a turbulent stream of hot air rising above the fire in the kitchen. She discussed about this with her friends and decided to raise the question in school's science club meeting.
    Read the given passage and answer the following questions:
    (a) Explain the reason behind the observation.
    (b) Name the similar phenomenon on a larger scale. Also, draw the ray diagram.
    (c) What values are shown by Sheeba?
15. How does natural vegetative propagation occur?
16. What are the male and female gonads in human beings? State any two functions of each of them.
17. Name any three organs homologous to human hand. Why are they considered homologous?
18. State three laws of Mendel.
19. Describe the anatomy of human male reproductive system.

    Or

    What is meant by tissue culture? How this technique is performed? In which area this technique is finding its application?
20. Explain double bond and triple bond with help of two examples in each case.

    Or

    Explain the following terms:
    (a) Emulsifying (b) Substitution reaction (c) Polymerization
    (d) Saponification (e) Methylated spitit
21. Tabulate the process of reproduction into its various types, giving one example of each type.

    Or

    Define grafting. Suggest any two advantages and disadvantages of grafting.
22. Explain the cleansing action of soaps and detergents.

    Or

    Write in short, how carbon compounds are named according to IUPAC nomenclature?
23. (i) State the lens's formula and its magnification.
    (ii) Using the lens formula, locate the position of an image formed due to an object at infinity by a convex lens of focal length f.

    Or

    (i) How will you find the net focal length of a combination of lenses whose focal length are 15 cm and -5 cm respectively?

(ii) Define power. Find the power of the combination and express whether it is converging or diverging combination.

24. Draw a labelled diagram of human eye and explain the image formation.

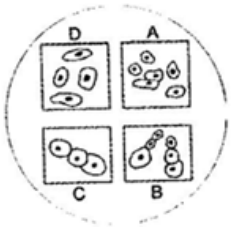
Or

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

Section B

25. (i) When acetic acid reacts with ethyl alcohol, we add conc. H_2SO_4. It acts as _____ and the process is called _____.
(ii) Write the chemical equation for the same.

26. (i) A student observed a slide of yeast under a microscope and saw collection of cells in different parts of the slide marked A, B, C and D as shown below:



(ii) Justify your answer.

27. (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 distant 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.
(a) Justify your answer.

28. 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) settles down in the test tube.
(d) reacts with acetic acid and a clear solution is obtained.

29. Sodium bicarbonate solution is added to dilute ethanoic acid. It is observed that:
(a) a gas evolves.
(b) a solid settles at the bottom.
(c) the mixture becomes warm.
(d) The colour of the mixture becomes light yellow.

30. Regeneration observed in:
(a) Starfish (b) Earthworm (c) Hydra (d) All of these

31. In which of the following reproduction parental identity is lost
(a) Budding (b) Binary fission (c) Multiple fission (d) All of above

32. The sex of the human child depends on the sex chromosome present in the:
    (a) Egg (b) Sperm (c) Both (a) & (b) (d) None of these

33. Who proposed the law of heredity:
    (a) Darwin (b) Mendel (c) Morgan (d) Dalton

34. The convex lens having surface of same radii is called as:
    (a) Equi-convex lens (b) Equi-planar lens
    (c) Plano-convex lens (d) Water lens

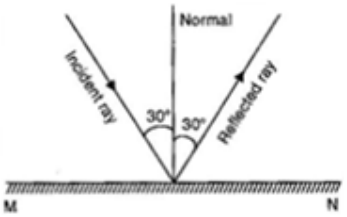
35. If parallel beams, non-parallel to principal axis fall on the convex lens, they converge at a point:
    (a) On principal axis (b) Away from principal axis
    (c) Centre of curvature (d) Called focus on the axis

36. Rajiv put the 10 g raisins in 100 mL distilled water which is at 10^{o} C below the room temperature while Ajay put the same amount of raisins in 100 mL distilled water at 10^{o} C above the room temperature. After an hour, percentage of water absorbed by the raisins will be:
    (a) Same in both cases.
    (b) More in Rajiv's beaker.
    (c) More in Ajay's beaker.
    (d) Exactly twice as much as in Ajay as in Rajiv' beaker.

CBSE Sample Paper-03
SUMMATIVE ASSESSMENT –II
SCIENCE (Theory)
Class – X

(Solutions)

SECTION-A

1. 

2. Domestic sewage and wood.
3. Soaps are the sodium or potassium salts of long chain fatty acids. These are represented by RCOONa or RCOOR
4. Importance of water is-
   (a) It is necessary for living organism to carry out their metabolic reactions.
   (b) Water is a universal solvent.
   (c) It is used for cleaning, washing, drinking, etc.
   (d) It helps in excretion.
   (e) It helps in transportation inside the body.

5. ${}_{air}\mu_{ice} = 1.31, \quad {}_{air}\mu_{rock} = 1.54$

   ${}_{ice}\mu_{rock} = \frac{{}_{air}\mu_{rock}}{{}_{air}\mu_{ice}} = \frac{1.54}{1.31} = 1.18$
6. K is larger in atomic size, therefore, it can lose electrons easily due to less force of attraction between valence electrons and nucleus than Li.
7. $f = +200cm$

   $U = -100cm$

   $\frac{1}{f} = \frac{1}{v} + \frac{1}{V}$

   $\frac{1}{v} = \frac{1}{f} - \frac{1}{V}$

   $\frac{1}{v} = \frac{1}{200} + \frac{1}{100}$

   $\frac{1}{v} = \frac{3}{200}$

$$v = \frac{200}{3} = 66.67cm$$

$$m = \frac{-v}{V} = \frac{-66.67}{-100}$$

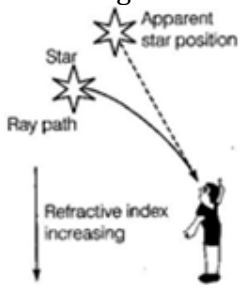
$$m = 0.666$$

Image is virtual

8. (i) Snell's law : The ratio of the sine of the angle of incident to the sine of the angle of refraction is a 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.
9. 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 considered *+ve*.
   (iii) All measurements done above the principal axis are to be considered *+ve*.
10. Optical fibres are tubes of glass which transmit light without significant absorption of light energy. T.I.R is the phenomenon used for this purpose. It is used for (i) Communication, (ii) Bio-medical engineering and (iii) Medical applications without operating the patient.
11. The three ways to maintain a balance between environment and development to survive are as follows:
   (i) Forest resources should be used in an environmently and developmently sound manner.
   (ii) The benefits of controlled exploitation of resources go to the people and the environment is also preserved.
   (iii) If the exploitation is too high, economic and social development will be faster but the environment will further deteriorate.
   We should use natural resources cautiously so that economic growth and ecological conservation go hand in hand.
12. This occurs due to biological magnification. When pesticides like DDT are used to protect crops from diseases and pests. These non-biodegradable substances enter the soil. From soil these substances are absorbed by plants along with water and minerals. The food plants when consumed by organisms, they get accumulated at different trophic levels. As the human beings occupy the top position in any food chain, maximum concentration of such harmful chemicals get accumulated in the bodies of man.
13. (a) Isotopes needed separate place if basis of classification is atomic mass which is not possible because they have same chemical properties. That is why basis of classification must be atomic number and not atomic weight.
   (b) Increasing order of atomic masses could not be maintained.
   (c) Some elements with similar properties were kept in different groups whereas some elements with dissimilar properties we kept in same group.

14. (a) The air just above the fire becomes hotter than the air further up. The hotter air is lighter (less dense) than the cooler air above it and has a refracting index slightly less than that of the cooler air. Since, the physical conditions of the refracting medium (air) are not stationary, the apparent position of the object as seen through the hot air, fluctuates.

    (b) Twinkling of stars is a similar phenomenon on a much larger scale.



    (c) Values shown by Sheeba are friendship, concern for each other, practical mind and cooperative attitude

15. Natural vegetative propagation occurs from modified stems, roots, leaves and bulbs. Modified short stems, onion bear **bulbs** which when grown in soil develop into a new plant. **Runners** - stems of doob grass have nodes and internodes. From nodes, roots are developed that formed a new plant. **Rhizome** of ginger is a horizontal underground stem. If kept in soil with adequate moisture it develops into a new plant. **Tuber** of potato bears eyes (buds), which if sown (entire or in pieces) in soil develops into a new plant. Modified root **tubers** of sweet potato also grow into a new plant.

    Buds produced in the notches along the leaf margin of *Bryophyllum* fall on the soil and develop into new plants.

16. Male gonads are testes and female gonads are ovaries in human beings.

    Function of testes:

    (i) Testes produce sperms, the male haploid gametes.

    (ii) They produce male sex hormone, i.e. testosterone.

    Functions of ovaries:

    (i) They produce ova, the female haploid gametes.

    (ii) They produce female sex hormone, i.e. estrogen and progesterone.

17. 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.

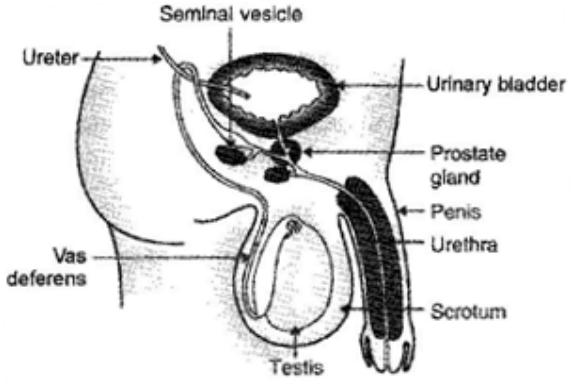
18. Mendel's law-

    (a) Law of dominance- when two dissimilar factors of a character are present in an organism only one expresses itself (dominant factor) while other remain unexpressed (recessive factor).

    (b) Principle of segregation – two factors of a character is separated at the time of gamete formation and each gamete gets only one factor for that character.

(c) Principle of independent assortment- this principle states that inheritance of two or more pair of contrasting traits is such a way that one pair of contrasting traits is independent of the other pair of contrasting traits.

19. **Male reproductive system**: It consists of portions that produce the germ-cells and other portions that deliver the germ-cells to the site of fertilization. The human male reproductive system consists of the following organs:



Human Male Reproductive System

- **Testes** (singular testis) are the oval-shaped primary reproductive organ in man. A pair of testis lies in a small sac-like muscular structure outside the abdominal cavity called scrotum. The function of testis is to produce sperm and male sex hormones called testosterone. The scrotum provides the optimal temperature for formation of sperms.
- **Epididymis** is a coiled tube like structure firmly attached to the testis and serves as the storehouse of sperms. Inside the epididymis, sperms become mature and develop motility.
- **Vas deferens**. The sperms are carried by a long tube called Vas deferens or sperm duct into organs called seminal vesicles, where the sperms get nourished and stored.
- **Urethra** is a common duct for the passage of both urine and spermatic fluid. Urethra carries the sperms to an organ called penis which opens to the outside through a male genital pore.
- **Penis** forms the external male genital organ. It is a copulatory organ which thick muscular walls.
- **Accessory Glands**. Seminal vesicles are a pair of thin-walled muscular elongated sac which secretes fluid for nourishment of sperms.
- **Prostate glands** also produce fluid which is released in the urethra along with secretion of seminal vesicle. The secretion of accessory glands together with sperms is called semen.
- **Sperms** are tiny bodies that consist of mainly genetic material and a long tail which help them to move towards the female germ cell.

Or

Tissue culture is the production or propagation of new plants from isolated plant cells or small pieces of plant tissue in a synthetic medium of culture solution. Tissue culture for producing new plants is done as follows:

- Plants are grown by removing tissues or separating cells from the growing tip of the plant and put in an artificial medium.
- The plant tissue divides to form small group of cells or callus.
- The callus is transferred to another medium containing hormones for growth and differentiation that form plantlets.
- The plantlets produced are transplanted into pots or soil where they can grow to form mature plant.
- This techniques is also known as micro-propagation in vitro because it takes place outside the body of the parent plant in a test tube using an artificial environment.
- Micro-propagation technique is being used for the production of ornamental plants like Orchids, Dahlia and Carnation.

20. (i) Lens's formula : $\frac{1}{f}=\frac{1}{v}-\frac{1}{u}$

Magnification $(m)=\frac{v}{u}$

(ii) Since $u=-\infty$ and $\frac{1}{f}=\frac{1}{v}-\frac{1}{u}$,

$\therefore$ The image distance should be equal to focal length. The image is formed at the focus.

Or

(i) Net focal length of a combination of lenses can be found by using the relation,

$$\frac{1}{f}=\frac{1}{f_1}+\frac{1}{f_2}$$

If f_1 = 15 cm and $f_2=-15$ cm, then

$$\frac{1}{f}=\frac{1}{15}-\frac{1}{5}=\frac{1-3}{15}=\frac{-2}{15}$$

$\therefore\ f=-7.5$ cm

(ii) Power is defined as the ability to converge or diverge the light after refraction. It is the reciprocal of focal length, i.e. P = $\frac{1}{f}$ and is expressed in dioptres.

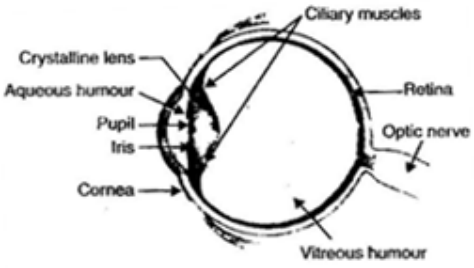
Power of the combination of two lenses is $P = P_1 + P_2$

Since f_1 = 15 cm and $f_2=-15$ cm, then

$P_1 = \frac{+100}{15}$ = 6.6 dioptre and $P_2 = \frac{-100}{5} = -20$ dioptre

Since $P_1 + P_2$is the equivalent power is negative and so the combination behaves as a concave lens.

21.

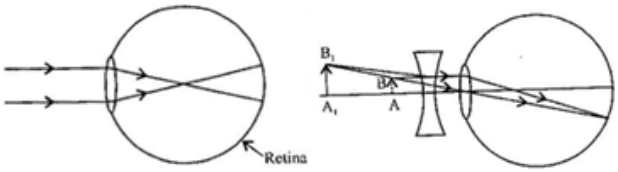


Human Eye

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 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

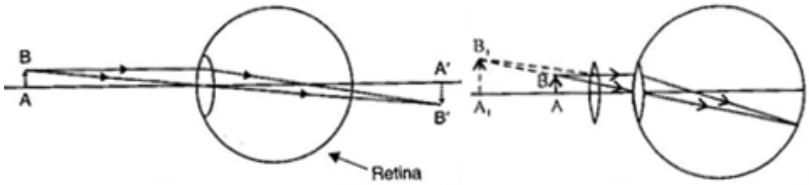
Or

(i) Cause for Myopia: Excessive curvature of the cornea or the elongation of the eye-ball.



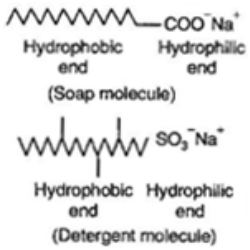
It is corrected by concave lens of suitable focal lens.

(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.



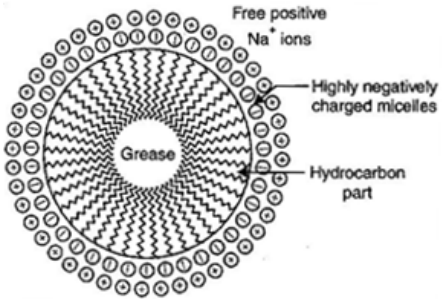
It is correct by the convex lens of suitable focal length.

22. Soaps and detergents consist of a large hydrogen chain as tail and a negatively charged functional group as head. The tail is hydrophobic (water repelling) and the head is hydrophilic (water loving).



In aqueous solution, water molecules being polar in nature, surround the ions (hydrophilic part) and not the hydrophobic part of the soap or detergent. In cleansing clothes, the hydrocarbon or hydrophobic part attaches itself to oily dirt, thus forming a cluster called **micelles**. When water is agitated, the oily dirt tends to lift off from the surface of the clothes

and dissociate into fragments. This gives opportunity to other tails to stick to oily dirt. The solution now contains small globules of oily dirt surrounded by soap/detergent molecules. The negatively charged heads present in water prevent the small globules from coming together and form aggregates. This results in the removal of dirt when clothes are further washed with water.



Or

Naming of carbon compounds can be done by the following method:

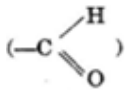
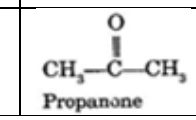
(i) Identify the number of carbon atoms in the compounds. For example a compounds containing three carbon atoms would have the name propane, containing five carbon atoms would have the name pentane.

(ii) In case, a functional group present, it is indicated in the name of the compound with either a prefix or a suffix as given in table below.

(iii) If the name of the functional group is to be given as a suffix, the name of the chain is modified by deleting the final 'e' and adding the appropriate suffix. For example, a three carbon chain with a ketone group would be named in the following manner:
Propane – 'e' = Propan + 'one' = Propanone

(iv) If the carbon chain is unsaturated, then the final 'ane' in the name of the carbon chain is substituted by 'ene' or 'yne' as given in the table below. For example, a three carbon chain with a double bond would be called propene and if it has a triple bond, it would be called propyne.

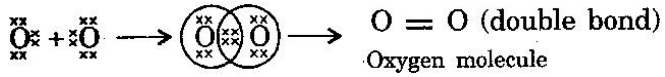
Nomenclature of functional group

Functional Group	Prefix/ Suffix	Examples
Halogen (cl, Br, I)	Prefix – chloro, bromo, iodo, etc.	$CH_3CH_2CH_2Cl$ *Chloropropane* CH_3CH_2Br *Bromoethane*
Alcohols (-OH)	Suffix - ol	$CH_3CH_2CH_2-OH$ *Propanol*
Aldehyde 	Suffic - al	CH_3CH_2-CHO *Propanal*
Ketone 	Suffix - one	 Propanone

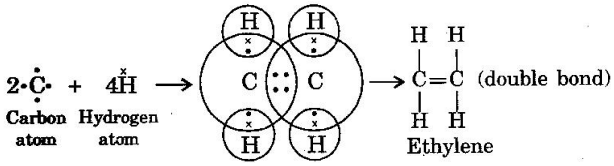
Carboxylic acid (—C(=O)—OH)	Suffix – oic acid	CH_3CH_2-COOH *Propanoic acid*
Double bond (alkenes) $(-C=C-)$	Suffix - ene	$CH_3CH=CH_2$ *Propene*
Triple bond (alkynes) $(-C=C-)$	Suffix-yne	$CH_3-C=CH$ *Propyne*

23. **Double bond**: The bond formed between two atoms by sharing of two pairs of electrons is called a double bond.

Examples: Formation of Oxygen molecule.

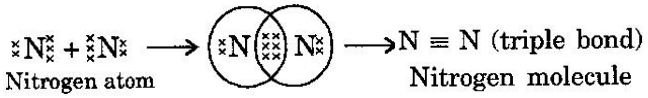


Formation of Ethylene molecule

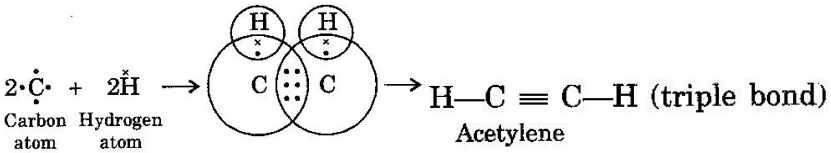


Triple bond: The bond formed between two atoms by sharing of three pairs of electrons is called a triple bond.

Examples: Formation of Nitrogen molecule.



Formation of Acetylene molecule



Or

(i) **Emulsifying action**: The action of soaps and detergents on dirt in clothes is called emulsifying action.

(ii) **Substitution reaction**: Reactions in which an atom or group of atoms of a compound is replaced by other atom of group of atoms.

(iii) **Polymerisation**: Process in which similar of different molecules combine together in the presence of catalyst to form long chain compounds.

(iv) **Saponification**: Process in which an ester reacts with sodium hydroxide to form alcohol and sodium salt of acid.

(v) **Methylated spirit**: Ethyl alcohol contaminated with methyl alcohol and other impurities.

24.

Reproduction

Asexual (involves only one parent)

(i) Fission
- Binary *e.g., Amoeba*
- Multiple *e.g., Plasmodium*

(ii) Budding, *e.g., Hydra.*

(iii) Spore formation, *e.g., Rhizopus*

(iv) Regeneration, *e.g., Planaria.*

Sexual (involves the fusion of two gametes, male and female) *e.g.,* Man

(v) **Vegetative propagation**

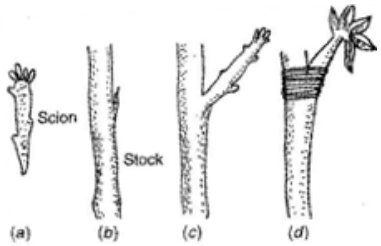
Natural
- (i) By roots, *e.g., Dahlia*
- (ii) By stems, *e.g.,* Potato (tuber)
- (iii) By leaves, *e.g., Bryophyllum*

Artificial
- (i) Cutting, *e.g.,* rose plant.
- (ii) Layering, *e.g,* Jasmine.
- (iii) Grafting, *e.g.,* Mango.
- (iv) Tissue culture, *e.g.,* Orchids.

Or

Grafting: In this method of reproduction, two plants of closely related varieties are joined together so that they live as one plant.

- The portion of a plant that is grafted on the other plant is called scion and the plant in which grafting is performed is called the stock.
- This method is applied to improve variety of fruits like mango, apple, peas, citrus and guava.



Different stages in Grafting

Advantages:

(i) A young scion can be made to flower when it is grafted on a mature true.

(ii) Different varieties can be grafted on the same stock.

Disadvantages:

(i) Sexual reproduction is a necessity for evolution.

(ii) Plants produce very few seeds.

Section B

25. (i) dehydrating agent, esterification

(ii) $CH_3COOH + C_2H_5OH \xrightarrow{\text{conc. } H_2SO_4} CH_3COOC_2H_5 + H_2O$

26. (i) Slide A is showing the budding in yeast.

(ii) Because buds appear as protuberances.

27. (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.

28. (d)

29. (a)
30. (d)
31. (b)
32. (b)
33. (a)
34. (a)
35. (b)
36. (c)