CBSE Sample Paper-01
SUMMATIVE ASSESSMENT –II
SCIENCE (Theory)
Class – X

Time allowed: 3 hours Maximum Marks: 90

General Instructions:

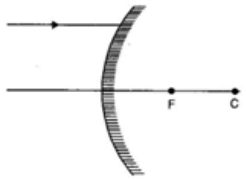
a) All questions are compulsory.
b) The question paper comprises of two sections, A and B. You are to attempt both the sections.
c) Questions 1 to 3 in section A are one mark questions. These are to be answered in one word or in one sentence.
d) Questions 4 to 6 in section A are two marks questions. 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. Name any two non-biodegradable wastes.
2. Name the classes of organic compounds represented by the following formulae:

   (i) $C_2H_5NH_2$ (ii) $H_3C-\overset{\overset{O}{\|}}{C}-CH_3$

3. A ray of light incident on a convex mirror as shown in figure. Redraw the ray diagram after completing the path of the light ray after reflection from the mirror.



4. Describe 'Total internal reflection of light'. What is the essential condition for it occurance?
5. Why does Silicon have valency 4 and Chlorine 1?
6. Use the mirror formula to show that an object lying between the pole and focus of a concave mirror, the image formed is always virtual in nature.

7. 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.
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. How would you dispose the following waste:
   (i) Domestic wastes like vegetable peels.
   (ii) Industrial wastes like metallic cans.
   (iii) Plastic material.
13. Give three drawbacks (limitations) of Mendeleev's Periodic Table.
14. A mother always wants her child to drink milk. As it is a boon for health. If one do not drink milk, he can face severe health problems.

   Answer the following questions on the basis of above text.
   (a) Name the major constituent / nutrient present in the milk.
   (b) Write the chemical symbol, atomic number and valency of that nutrient.
   (c) What value do you infer from the given text?
15. (i) Which are two main types of reproduction in living organisms?
   (ii) Classify the following under these two types:
   Amoeba, Frog, Earthworm, Yeast
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. Who was Mendel? Why was he called the "Father of Genetics"?
19. (i) What is genetics?
   (ii) Give the common name of the plant on which Mendel performed his experiments.

Or

   (i) What are 'chromosomes'? Where are they located in the cells?
   (ii) What is a sex chromosome?
   (iii) Explain the mechanism of sex determination in human beings.
20. Draw a ray diagram to show the formation of image of an object placed between the pole and focus of a concave mirror. Obtain the relation between u, v and f for a given concave mirror. State clearly the assumption involved and sign convention used.

Or

One half of a convex les is covered with a black paper. Will this lens produce a complete image of the object? Verify your answer experimentally. Explain your observations.

21. Draw a ray diagram in each case to show the position and nature of the image formed when the object is places:
    (i) At the centre of curvature of a concave mirror.
    (ii) Between the pole P and focus F of a concave mirror.
    (iii) In front of a convex mirror.
    (iv) At 2F of a convex lens.
    (v) In front of a concave lens.

Or

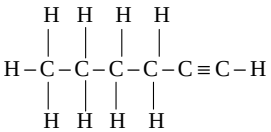
    (i) During its passages from one medium to another, when does a light ray change its path?
    (ii) Define the term absolute refractive index of a medium.
    (iii) With the help of a ray diagram, explain the term 'critical angle'.
    (iv) What is the value of refractive index of the medium if the critical angle of incident in a denser-rarer interface is equal to 45° ?

22. An organic compound A is widely used as a preservative 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 back 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.

Or

    (a) Why does carbon form largest number of compounds?
    (b) Why are some of these are called saturated 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)



23. (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) CH_3COCH_3, (ii) $CH_3CH_2CH_2CHO$
    (c) How will you test the presence of carboxylic acid?
    (d) Complete the following reaction:
    $CH_3CH_2OH + Na \longrightarrow$

Or

    (a) Give electron dot structure of (i) CO_2, (ii) H_2S, (iii) $CaCl_2$, (iv) AlF_3

(b) How will you differentiate between Ethane and Ethene by a suitable chemical test? Give chemical reactions involved.
(c) Why are detergents preferred over soaps? Give two reasons.

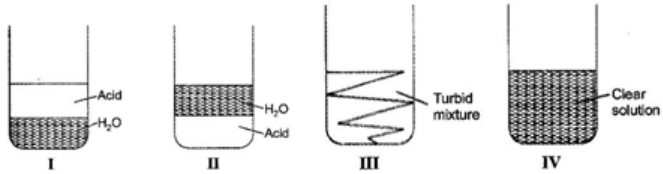
24. Trace the events that would take place in a flower from the time the pollen grains of the same species fall on the stigma up to the completion of fertilization.

Or

Discuss briefly the different types of reproduction.

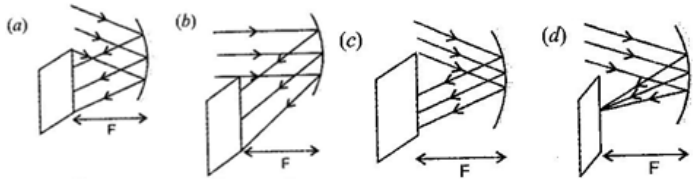
Section B

25. Five mL of acetic acid was added to 5 mL of water in a test tube.
(a) The resulting mixture is correctly represented in which diagram.
(b) Justify your answer.



26. Which process is shown in the figure of given slides A and B? Give reason also.

27. Which of the following pictures depict the correct image formation and why?



28. Glacial acetic acid is:
(a) 10% acetic acid (b) 50% acetic acid (c) 100% acetic acid (d) 5% acetic acid

29. Acetic acid, when dissolve in water, it dissociates into ions reversely because it is:
(a) It is a weak acid. (b) It is a strong acid. (c) It is a weak base. (d) It is a strong base

30. Binary fission occurs in:
(a) Plasmodium (b) Hydra (c) Pomegranate (d) Paramecium

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

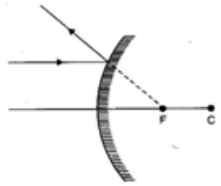
35. If parallel beams, non-parallel to principal axis fall on the convex lens, they converge at a point:
(a) On principal axis (b) Away from principal axis
(c) Centre of curvature (d) Called focus on the axis

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-01
SUMMATIVE ASSESSMENT –II
SCIENCE (Theory)
Class – X

(Solutions)

SECTION-A

1. DDT and polythene bags.
2. (i) Amines, (ii) Ketones
3. 

4. **Total internal reflection**: When a ray of light passes from a denser to rarer medium in such a way that its angle is incident exceeds the critical angle, it undergoes reflection instead of refraction. This phenomenon is called total internal reflection.
   Essential conditions for total internal reflection:
   (i) Light should pass from denser to rarer medium.
   (ii) Angle of incident should be greater than the critical angle for the pair of media in contact.
5. Si has 4 valence electrons, it needs four electrons to complete its octet so its valency is 4.
   Cl has 7 valence electrons, it needs 1 electron to complete its octet so its valency is 1.
6. Mirror formula is, $\frac{1}{f}=\frac{1}{v}+\frac{1}{u}$ where u, v and f are object distance, image distance and focal length respectively.
   $\Rightarrow \quad \frac{1}{v}=\frac{1}{f}-\frac{1}{u}$
   Focal length and object distance are both negative for concave mirror and it is given that $u < f$,
   $\therefore \quad \frac{1}{v}$ becomes $\frac{-1}{f}+\frac{1}{u}$ and is positive.
   $\therefore \quad v$ becoming positive denotes a virtual image.
7. $f=-20$ cm, $h_o = 5$ cm, $v=-15$ cm
   Using $\frac{1}{f}=\frac{1}{v}-\frac{1}{u}$ we get, $\frac{1}{u}=\frac{1}{v}-\frac{1}{f} \quad \Rightarrow \quad \frac{1}{u}=\frac{1}{-15}-\frac{1}{-20}$
   $\Rightarrow \quad \frac{1}{u}=\frac{-20+15}{300}=\frac{-5}{300} \quad \Rightarrow \quad u=-60$ cm

Since $m = \frac{h_i}{h_o} = \frac{v}{u}$ $\Rightarrow$ $h_i = \frac{v}{u} \times h_o = \frac{(-15)}{(-60)} \times 5 = \frac{5}{4}$

$\therefore$ Image is enlarges and 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. (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 be recycled and can be reused; for example, plastic bags, bucket etc.
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) Placenta is mainly responsible for providing nutrition to growing embryo.
   (b) The measures to maintain a woman's health during pregnancy care:
   (i) Mother should eat healthy, balanced and nutritious diet and should be stress free.
   (ii) She should not take any medicine without doctor's advice.

(c) The learner will appreciate the idea that it is very important for all of us to help somebody in need and cooperate them. It is also inferred that mutual benefits are the spine of a healthy and successful society. Moreover, the nutritional rights for a healthy life should be provided to everyone.

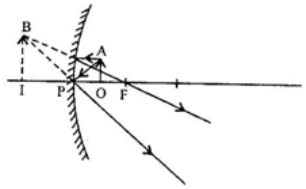
15. (i) The two main types of reproduction in living organisms are –
Asexual reproduction and Sexual reproduction
(ii) Asexual reproduction : Amoeba, Yeast
Sexual reproduction : Frog, Earthworm

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.

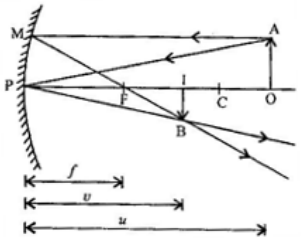
17. The three organs homologous to human hand are whale's flipper, bat's wing and cat's paw.
They are considered homologous because they have a similar plan and contain approximately the same number of bones. The pattern of their embryonic development is also similar hence they are called homologous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

18. Gregor Johann Mendel (1822 – 1884) was an Austrian genetics.
He lives as a monk from 1843. He sowed the garden pea (Pisumsativum) 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".

19. Image formed by concave mirror when object is placed between the pole and the focus of the mirror.
Image is erect and enlarged.



Consider a concave mirror. Light from object OA placed beyond C will form a real, inverted and diminished image between F and C.



From similar triangles OAP and IBP, we get, $\frac{OA}{IB} = \frac{PO}{PI} = \frac{u}{v}$

From similar triangles, MPF and IBF, we get $\frac{MP}{IB}=\frac{OA}{IB}=\frac{PF}{FI}=\frac{f}{v-f}$

$\therefore \quad \frac{u}{v}=\frac{f}{v-f}$

Cross-multiplying and then dividing all terms by uvf, we get $\frac{1}{f}-\frac{1}{v}=\frac{1}{u}$

$\Rightarrow \quad \frac{1}{f}=\frac{1}{u}+\frac{1}{v}$ This is required mirror formula.

Assumption:

(i) Aperture of mirror is small.

(ii) Rays fall close to the principal axis.

Sign convention:

(i) All distances are measured from the pole.

(ii) Length in the direction of incident ray are positive, while in the opposite direction are negative.

20. **Types of reproduction**: There are two main methods in which organisms give rise to new individuals:

(i) **Asexual reproduction**: It is the process of reproducing new organism from a single parent without the involvement of sex cells or gametes.

Examples:

Fission: This is the simplest method in unicellular forms of life chas Amoeba, Paramoecium and other protozoa. Fission is of two types, Binary fission and Multiple fission.

Fragmenatation: Multicellular organisms with simple body organization such as filamentous algae – Spirogyra breaks up into two or more samlle pieces or fragments upon maturation.

Regenration: It is the ability of a fully differentiated organism to give rise to new individual organisms from its body part. Example: Hydra

Budding: In budding a small part of the body of the parent grows out as a 'bud' which then detaches and becomes a new organism.

Vegetative propagation: In this method, new plants are obtained from the parts of old plants like stems, roots and leaves without the help of any reproductive organ. There are two types of vegetative propagation, (i) Natural vegetative propagation and (ii) Artificial vegetative propagation.

Tissue Culture: It 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.

Spore formation: When a slice of bread is kept in moist dark place for a few days, spores of Rhizopus present in air settle on the bread to form new fungus plants of Rhizopus.

(ii) **Sexual Reproduction**: It is the process of reproducing new organism from two parents by making use of their sex cells or gametes.

The male sexual unit is known as male gamete or sperm while female sexual unit is termed as female gametes or ova.

Thus, the two major process, i.e. formation of gametes and fusion of gametes constitute sexual reproduction.

Examples: Humans, fish, frogs, cats dogs and most flowering plants.-

Or

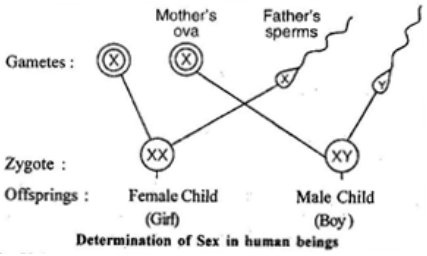
(i) **Chromosomes** are long thread-like structures which contain hereditary information of the individual and thereby the carriers of gene.

(ii) **Sex chromosomes** are the chromosomes that carry genes for sexual characters i.e. those chromosomes determine the sex of a person.

There are two types of sex chromosomes, one is called **X chromosome** and the other is called **Y chromosome**. X chromosome posses the genes for femaleness and Y chromosome for maleness.

(iii) Mechanism of Sex determination in human beings: It is a process by which the sex of a person is determined. Genetics is involved in the determination of sex of a person which is explained as follows:

- A female has one X chromosome and one Y chromosome, i.e. half of the male gametes or sperms will have X chromosome and the other half will have Y chromosome.
- A female has two X chromosomes, i.e. all the female gametes or ova will have only an X chromosome.
- Sex of a child depends upon on what happed at fertilization.



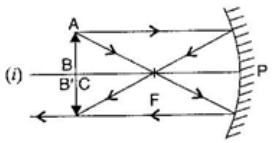
Determination of Sex in human beings

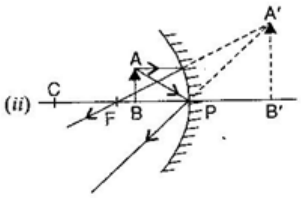
(a) If a sperm carrying X chromosome fertlizes an ovum, which carries X chromosome, then the child born will be a girl.

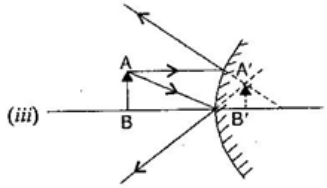
(b) If a sperm carrying Y chromosome fertilizes an ovum, which carries X chromosome, then the child born will be a boy.

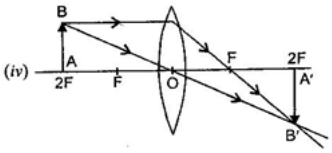
- Thus, the sperm determines the sex of a child.

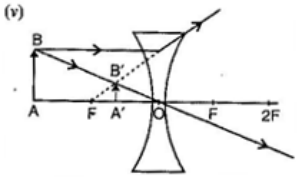
21.







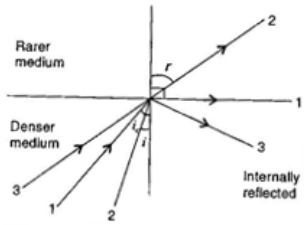




Or

(i) Light ray changes its path at the interface or boundary separating two media.

(ii) Absolute refractive index of a medium: The refractive index of a medium with respect to the vacuum or air is called the absolute refractive index of a medium.



(iii) Critical angle: The angle of incident in the denser medium for which the angle of refraction in rarer medium is 90°, called critical angle for the given pair of contact.

$1 \rightarrow i = i_c \rightarrow r = 90^\circ$

$2 \rightarrow i < i_c \rightarrow$ Refraction

$3 \rightarrow i > i_c \rightarrow$ Total internal reflection

As shown in figure, if the incident angle is less than the critical angle, the ray is partially refracted and partially reflected in the denser medium. But when angle of incident increases and equal to an angle for which the refracted ray travels along the interface and makes refracting angle 90° and light cannot escape the denser medium. So angle is the critical angle. From Snell's law, $i = i_c, r = 90^\circ$

$$\frac{\sin i}{\sin 90^\circ} = n_{21} = \frac{1}{n_{12}} \quad \Rightarrow \quad n_{12} = \frac{1}{\sin i_c}$$

Where n_{12} is refractive index of denser medium with respect to rarer medium and i_c is called critical angle.

(iv) Given $i_c = 45^\circ$

$$\therefore \; n_{12} = \frac{1}{\sin 45^\circ} = \frac{1}{1/\sqrt{2}} = \sqrt{2} = 1.41$$

$\therefore$ Refractive index of a denser medium with respect to air is 1.41.

22. (i) Compound A is CH_3COOH.

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

(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).

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

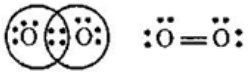
Or

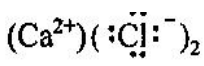
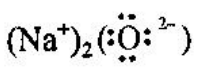
(a) Carbon forms large number of compounds due to its tetravalency as well as property of catenation.

(b) Those compounds 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 compounds are more reactive than saturated compounds.

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

23. (a) (i)  (ii) 

(iii)  (iv) 

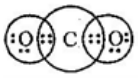
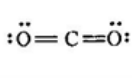
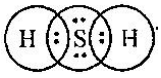
(b) IUPAC name (i) Propanone, (ii) Butanal.

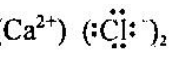
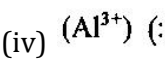
(c) Add sodium bicarbonate solution, If there is brisk effervescence due to evolution of CO2, the presence of carboxylic acid is confirmed.

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

(d) $2CH_3CH_2OH + 2Na \longrightarrow 2CH_3CH_2ONa + H_2$ (g)

Or

(a) (i)   (ii) 

(iii)  (iv) 

(b) Add Bromine water. Ethene will decolourise bromine water whereas ethane does not.

$$CH_2 = CH_2\ (g) + Br_2\ (aq) \longrightarrow \underset{\text{(Colourless)}}{\overset{CH_2Br}{\underset{CH_2Br}{|}}}$$

(d) (i) Detergents are more effective than soaps.

(ii) They can work well even with hard water whereas soap does not.

24. The events that would take place in a flower from the time the pollen grains of the same species fall on the stigma up to the completion of fertilization are as follows:
    (i) The pollen grains deposited on the stigma are held by the sticky secretion of stigma and start their germination.
    (ii) A short cytoplasmic outgrowth called germ tube emerges through a germ pore and continuous to grow as a pollen tube.
    (iii) The vegetable nucleus first move to the tip of the tube followed by the generative nucleus.
    (iv) The pollen tube secretes enzymes that hydrolyze the reserved food materials in the tissues of stigma and style and utilize them.
    (v) The generative nucleus divides mitotically into two male nuclei.
    (vi) The pollen tube enters the ovule through the micropyle and discharges the two male gametes into the embryo sac.
    (vii) One of the male gametes fuses with the egg nucleus to form a zygote and the other fuses with the secondary nucleus (triple fusion) primary endosperm nucleus; the two fusions are termed as double fertilization.

Section B

25. (a) Figure IV is the correct representation of the resulting mixture.
    (b) Acetic dissolves in water forming true solution which is homogeneous solution (clear solution).
26. Slide A – Binary fission in Amoeba, Slide B – Daughter cells of Amoeba.
    In binary fission of Amoeba, nucleus divides first, then the cytoplasm and daughter cells are formed.
27. Figure *d* depicts the correct image formation because parallel beams getting reflected from the concave mirror will converge at focus to produce a sharp image.
28. (c)
29. (a)
30. (d)
31. (b)
32. (b)
33. (a)
34. (a)
35. (b)
36. (c)