

Section - A

1. (D)

Sol. The formation of a rainbow is a natural phenomenon which is caused by the dispersion of sunlight in the sky.

2. (C)

Sol. Ammeter is always connected in series and voltmeter in parallel.

3. (C)

4. (D)

5. (B)

6. (D)

7. (A)

8. (A)

9. (C)

10. (D)

11. (A)

12. (C)

13. (A)

14. (B)

15. (C)

16. (D)

17. (C)

Sol. The near-point of a hypermetropic eye is more than 25 centimetres away. Hypermetropia is corrected by convex lens.

18. (C)

19. (A)

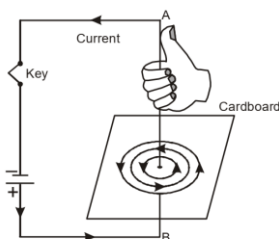
20. (B)

Section - B

21. (1) At constant temperature, the current flowing through a conductor is directly proportional to the potential difference across its ends.

(2) The commercial unit of electrical energy is kilowatt-hour which is written in short form as kWh.

22. The magnetic lines of force form concentric circles near the wire, with their plane perpendicular to the straight conductor and with their centres lying on its axis. If the direction of current in the wire is reversed, the direction of lines of force is also reversed



OR

(i) $R_1 = 7\Omega$

$R_2 = 5\Omega$

$R_3 = 10\Omega$

R_2 and R_3 are joined in parallel. Hence the equivalent resistance R_p of this combination is given by

$$\frac{1}{R_p} = \frac{1}{R_2} + \frac{1}{R_3}$$

$$= \frac{1}{5} + \frac{1}{10}$$

$$= \frac{2+1}{10}$$

$$\frac{1}{R_p} = \frac{3}{10}$$

$$R_p = \frac{10}{3}\Omega$$

R_p and R_1 are joined in series. Hence the equivalent resistance R_s of this combination is given by

$$R_s = R_p + R_1$$

$$= \frac{10}{3} + 7$$

$$= \frac{10+21}{3}$$

$$= \frac{31}{3}\Omega$$

$$= 10.33\Omega$$

Resultant resistance (R_{eq}) is 10.33Ω

(ii) $I = \frac{V}{R_{eq}}$

$$I = \frac{6}{\left(\frac{31}{3}\right)}$$

$$= \frac{18}{31}$$

$$= 0.58A$$

23. (i) The black coloured substance is formed due to the reaction of Cu with air.
 (ii) Copper reacts with oxygen present in air to form copper oxide, which is black in colour. The black substance is the copper oxide.
 (iii) $2Cu + O_2 \rightarrow 2CuO$

OR

(i) Most acidic - A,

Most basic - C

(ii) From the given data we can say that;

Solution A is acidic in nature.

Solution B is basic in nature.

Solution C is basic in nature and it is more basic than solution B as its pH is more than that of solution B.

Solution D is neutral in nature.

Hence, the increasing order of given solutions ion concentration is

$C < B < D < A$

24. (i) If there is an error in DNA copying or mutation, then newly formed DNA copies may not be identical at time.

(ii) Organism which reproduces by spore formation is rhizopus, mucor and multiple fission is plasmodium respectively.

25. (i) The inner lining of the small intestine has numerous finger like projections called villi which increases the surface area for absorption of digested food.

(ii) Salivary glands secrete saliva which contains a digestive enzyme called ptyalin or salivary amylase that breaks down starch.



OR

Photosynthesis "The process by which green plants synthesize food from simple substances i.e. carbon dioxide and water in the presence of light and chlorophyll is called Photosynthesis".

Mode of nutrition; Autotrophic

Raw Materials; CO_2 , H_2O , Sunlight & Chlorophyll.

26. **Decomposers** : Those living organisms which decompose the dead bodies of producers and consumers and release mineral substances again into the soil which are present in the dead bodies.

The main decomposers in ecosystem are – bacteria and fungi

Importance of decomposers

- Decomposers help in mineral cycle.
- Only because of this land is the main source of minerals and is fertile.

Section - C

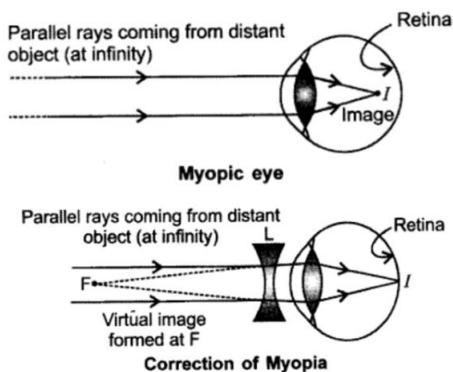
27. Velocity in any medium $v = \frac{c}{n}$

(a) The speed of light is minimum in medium D because it has highest refractive index.

(b) The speed of light is maximum in medium A because it has least refractive index.

$$(c) n_{CB} = \frac{n_C}{n_B} = \frac{1.52}{1.44} = \frac{19}{18} = 1.055$$

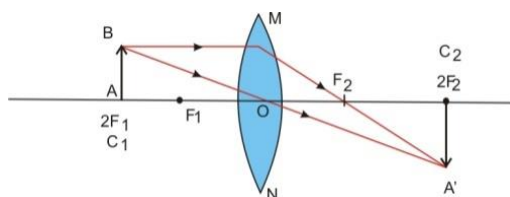
28. The image in this case is formed before the retina. For every myopic eye, there exists a far point beyond which clear image cannot be seen. The short – sightedness is corrected by using a concave lens which diverges and shifts the image to the retina.



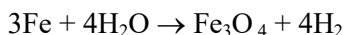
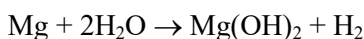
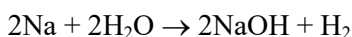
29. (a) Convex Lens
(b) Distance of Flame from lens = 2m
For equal sized inverted image $u = 2f = 2m$
 f is the focal length of lens
 $f = 1m$

So, Focal length of lens is 1m. The distance between the lens and the candle flame is 2m.

- (c) Ray Diagram



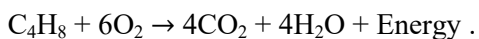
30. X is sodium, Y is magnesium and Z is iron.



Their sequence in reactivity series is as follows:

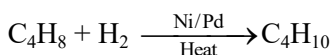


31. (i) Combustion reaction of the given compound is



- (ii) Hydrogenation reaction, where an unsaturated alkene/alkyne is converted to a saturated alkane, using the catalyst.

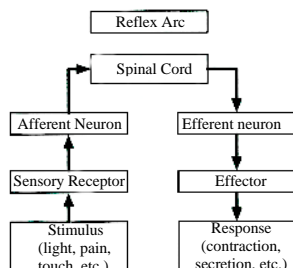
The chemical reaction is as follows,



So the name of compound is Butane.

- (iii) In this process unsaturated hydrocarbon undergoes an addition reaction with hydrogen by using nickel or palladium as catalysts to produce saturated hydrocarbons.

32. (a) The man is suffering from Diabetes mellitus.
Hormones is insulin
Endocrine gland is pancreas.
(b) Endocrine gland is pituitary gland.
(i) Deficiency of growth hormone causes dwarfism.
(ii) Excess secretion of growth hormone causes gigantism.
33. The pathway taken by nerve impulses in a reflex action is called the **reflex arc**.



Section - D

34. (a) The ratio of sine of angle of incidence to the sine of angle of refraction is constant for a given pair of media.
(b) Power of two lenses

$$P_1 = +1.5 \text{ D}$$

$$P_2 = -2.5 \text{ D}$$

The power of the combination is given by

$$\begin{aligned}
 P &= P_1 + P_2 \\
 &= +1.5 \text{ D} - 2.5 \text{ D} \\
 &= -1 \text{ D}
 \end{aligned}$$

The focal length of the combination is given by

$$\begin{aligned}
 P &= \frac{1}{f(\text{in m})} \\
 f &= \frac{1}{P} \\
 &= \frac{1}{-1} \\
 &= -1 \text{ m}
 \end{aligned}$$

- (c) The principal focus of a concave mirror is a point on its principal axis to which all the light rays which are parallel and close to the axis, converge after reflection from the concave mirror.

OR

- (a) For point of the person is 80 cm. Hence he is unable to see beyond 80 cm. This means the person is suffering from myopia. The type of lens used to correct myopia is a concave lens.

object distance (u) = $-\infty$

Focal length of the corrective lens is given by using lens formula

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

$$\frac{1}{f} = \frac{1}{(-80)} - \frac{1}{(-\infty)}$$

$$\frac{1}{f} = \frac{1}{-80}$$

$$f = -80 \text{ cm}$$

Power of the corrective lens is given by

$$\begin{aligned} P &= \frac{100}{f(\text{in cm})} \\ &= \frac{100}{-80} \\ &= -1.25 \text{ D} \end{aligned}$$

- (b) Hypermetropia (or long-sightedness) is that defect of vision due to which a person cannot see the nearby objects clearly (though he can see the distant objects clearly). Hypermetropia (long-sightedness or far-sightedness) is corrected by using spectacles containing convex lenses.

35. (i) Metal is Sodium

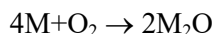
(ii) Na_2O

(iii) It is stored under kerosene because it catches fire, if kept in open.

(iv) Products would be NaCl and H_2O

(v)

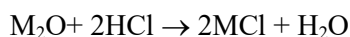
(a) Reaction of 'M' with air



(b) Reaction of 'M' with water

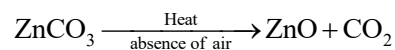


(c) Reaction of metal oxide with hydrochloric acid



OR

(a) First of all the carbonate ore of a metal is heated in absence of air. This process is called calcination.



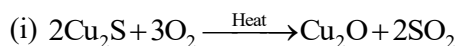
Then, ZnO is heated with coke.



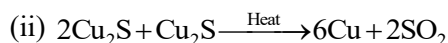
(b) Copper from its sulphide ore can be extracted simply by heating in air.

The steps involved are

Copper from its sulphide ore can be extracted simply by heating in air is known as roasting.

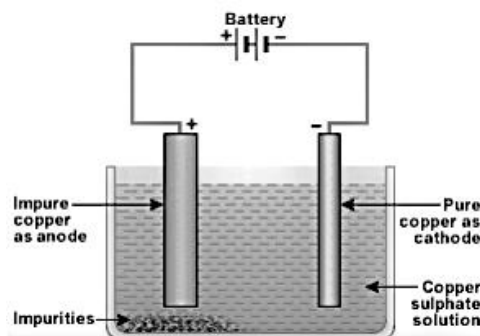


Copper oxide is then heated in the absence of air. Reduction of copper (I) oxide with copper (I) sulphide:



The impure copper metal is made anode and the pure metal of copper is cathode and copper sulphate is used as an electrolyte. Pure copper from electrolyte deposited on cathode and soluble impurities goes into solution and insoluble impurities remain in the solution and deposited at bottom of anode.

Labelled diagram of electrolytic refining of copper is



36. (i) MECHANISM OF URINE FORMATION

It has three steps - ultra filtration, selective reabsorption, secretion

(a) Ultra Filtration : Blood flows inside glomerulus under pressure due to narrowness of efferent arteriole. As a result it undergoes pressure filtration or ultrafiltration. All small volume solutes (e.g., urea, uric acid, amino acids, hormones, glucose, ions, vitamins) and water are filtered out and enter the Bowman's capsule. The product is called nephric or glomerular filtrate. Its volume is 125 ml/min (180 litres/day).

(b) Reabsorption : Nephric filtrate is also called primary urine. It passes into proximal convoluted tubule. The same is surrounded by peritubular capillaries. The latter reabsorb all the useful components of nephric filtrate, e.g. glucose, amino acids, vitamins C, calcium, potassium, sodium, chloride, bicarbonate and water (75%). Selective absorption also occurs in the region of distal convoluted tubule.

(c) Tubular Secretion : It occurs mostly in the distal convoluted tubule which is also surrounded by peritubular capillaries. Smaller amount of tubular secretion also takes place in the area of proximal convoluted tubule. Tubular secretion is active secretion of waste products by the blood capillaries. It cause removal of all the waste products from blood, like urea, uric acid, creatinine. Extra salts, K^+ and H^+ are also secreted into urinary tubule to maintain a proper concentration and pH of the urine.

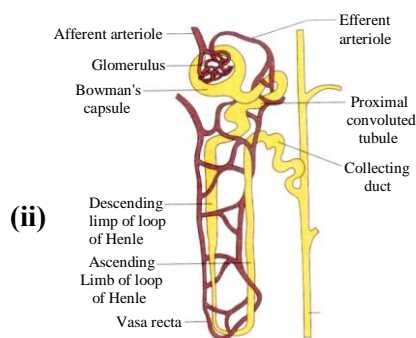


Figure : REPRESENTATION OF A NEPHRON

OR

(i) Garden pea plant (*Pisum sativum*)

Monohybrid Cross

Mendel crossed a pure breed tall plant (TT) and a pure breed dwarf plant (tt).

And he found that in F₁ generation only tall plant were born

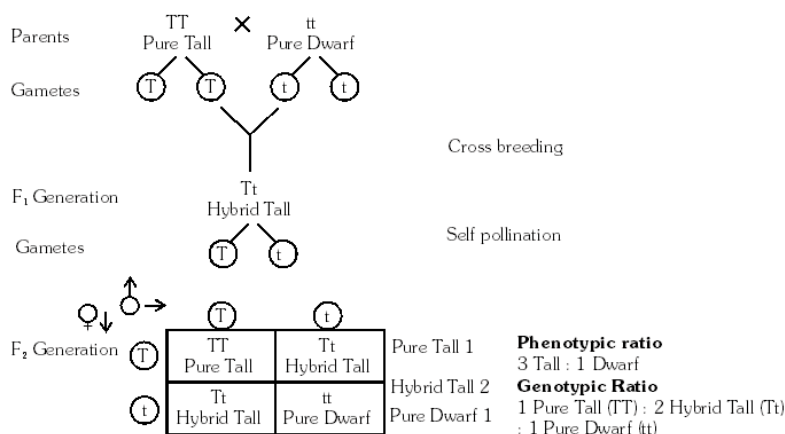


Fig. Monohybrid Cross

Section - E

Case study based questions are compulsory.

Question no. 37 to 39 are case-based/data-based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts.

37. Case Study-1:

- Resistance of a wire of unit length and unit cross-section area is known as the resistivity.
- The SI unit of resistivity of conductor is ohm-metre.
- Resistance depends on dimensions of the material like length, area of cross section while resistivity is independent of the dimensions of material.
- Before stretching of wire

$$\text{Resistance} = R_1$$

$$\text{length } (\ell_1) = \ell$$

$$\text{Area of cross section } (A_1) = A$$

$$R_1 = \frac{S\ell_1}{A_1}$$

$$R_1 = \frac{S\ell}{A_1} \quad \dots\dots\dots (1)$$

After stretching of wire

$$\text{Resistance} = R_2$$

$$\text{length } (\ell_2) = \frac{\ell}{2}$$

$$\text{Area of cross section } (A_2) = 2A$$

$$R_2 = \frac{S\ell_2}{A_2}$$

$$= \frac{S\left(\frac{\ell}{2}\right)}{2A}$$

$$R_2 = \frac{S\ell}{4A} \quad \dots\dots\dots (2)$$

from eqⁿ 1 & 2

$$R_2 = \frac{S\ell}{4A}$$

$$R_2 = \frac{R_1}{4}$$

The new resistance of wire is

$$R_2 = \frac{R_1}{4}$$

OR

length (ℓ) = 80 cm

Cross section area (A) = 0.025 cm²

Resistance (R) = 1.5 ohm

Resistivity of wire (s) = $\frac{RA}{\ell}$

$$\begin{aligned} &= \frac{1.5\Omega \times 0.025\text{cm}^2}{80\text{cm}} \\ &= \frac{1.5\Omega \times 0.025}{80} \Omega\text{-cm} \\ &= \frac{375}{80} \times 10^{-4} \Omega\text{-cm} \\ &= 4.6 \times 10^{-4} \Omega\text{-cm} \end{aligned}$$

38. Case Study-2:

- (i) A homologous series a series of chemical compounds that are having the same functional group and similar chemical properties and the successive members differ by a $-\text{CH}_2$ group.

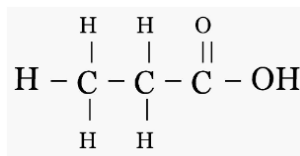
Molecular formula of compound is $\text{C}_5\text{H}_{11}\text{COOH}$

Molecular mass of the compound which has six carbon is 116 U

Carboxylic acids also form a homologous series and like all homologous series, the carboxylic acids have a general formula.

The general formula for the carboxylic acids is $\text{C}_n\text{H}_{2n+1}\text{COOH}$.

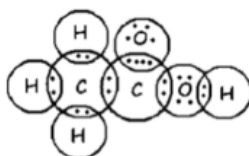
- (ii) structural formula of propanoic acid is



- (ii) The melting point of pure ethanoic acid is 290 K and hence it often freezes in cold climates and forms a colourless, ice-like liquid. This property has given it the name glacial acetic acid.

OR

- (iii) electron dot structure of ethanoic acid is :



39. Case Study-3:

- (i) The process of fusion of male & female gametes is called as fertilization.
- (ii) Oviduct/ fallopian tube.
- (iii) Placenta is a fully formed reddish brown disc embedded in the uterine wall, that serves to bring the fetal and maternal blood close enough to permit the exchange of materials between the two. This provides a large surface area for glucose and oxygen to pass from the mother to the embryo.
- (iv) A pair of ovaries, oviduct/ fallopian tube, uterus, cervix & vagina.

OR

If, a sperm is not available at the time of ovulation, then fertilization of ovum (or egg) does not take place. Since the ovum (or egg) does not take place. Since the ovum (or egg) is not fertilized, so the thick and soft uterus lining having lot of blood capillaries in it is not required. Thus, the unfertilized ovum (or egg) dies within a day and the uterus lining also breaks down.

The breakdown and removal of the inner, thick and soft lining of the uterus along with its blood vessels in the form of vaginal bleeding is called menstrual flow or menstruation.

Function of uterus: It is the site where embryo develops into a baby.

CLASS-X
SUBJECT- MATHEMATICS # SET-01
Section - A

Section A consists of 20 questions of 1 mark each.

1. (A)
2. (D)
3. (B)
4. (D)
5. (C)
6. (A)
7. (B)
8. (D)

Sol. DE || BC (given)

$$\therefore \frac{AD}{BD} = \frac{AE}{CE} \quad (\text{from BPT})$$

$$\Rightarrow \frac{AD}{7.8} = \frac{0.8}{4.8}$$

$$\Rightarrow AD = \frac{7.8 \times 0.8}{4.8} = 1.3 \text{ cm}$$

9. (C)
10. (D)
11. (B)
12. (D)
13. (C)
14. (B)
15. (D)
16. (A,D)
17. (A)
18. (C)
19. (D)
20. (A)

Section - B

Section B consists of 5 questions of 2 marks each.

21. 30
22. 100°
- Sol. by using (Angle sum property)
23. 2 : 3

24. $\frac{3}{2}$

25. 166

OR

$d = 3$

Section - C

Section C consists of 6 questions of 3 marks each.

26. $\frac{7}{15}$

27. 57

Sol. Given, $(x + 4)^2 = 3(7x - 4)$

$\Rightarrow x^2 + 16 + 8x = 21x - 12$

$\Rightarrow x^2 - 13x + 28 = 0$

Comparing with $ax^2 + bx + c = 0$, we get

$a = 1, b = -13$ and $c = 28$

Discriminant $= b^2 - 4ac$

$= (-13)^2 - 4 \times 1 \times 28$

$= 169 - 112 = 57$

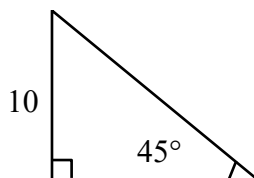
28. OR

Ans. 100°

Sol. $\angle OPQ = 90^\circ - 50^\circ = 40^\circ$

29. 14.41

Sol.



30. 150cm^2

Sol. Volume of a cube $= 125\text{ cm}^3$

i.e., $(\text{side})^3 = (5)^3$

\Rightarrow side $= 5\text{ cm}$

Now, surface area of a cube $= 6(\text{side})^2$

$$= 6(5)^2 \text{ cm}^2$$

$$= 150 \text{ cm}^2$$

31. (i) $\frac{1}{4}$

(ii) $\frac{1}{6}$

Section - D

Section D consists of 4 questions of 5 marks each.

32. $\frac{2}{3} \& -\frac{1}{7}$

Sol. $21y^2 - 11y - 2 = 0$

$$21y^2 - 14y + 3y - 2 = 0$$

$$(3y - 2)(7y + 1)$$

33.

34. We have,

$$\text{LHS} = \frac{\sin^2 A}{\cos^2 A} + \frac{\cos^2 A}{\sin^2 A} = \frac{\sin^4 A + \cos^4 A}{\sin^2 A \cos^2 A} \quad [\text{on taking LCM}]$$

$$\begin{aligned} & (\sin^2 A)^2 + (\cos^2 A)^2 + 2\sin^2 A \cos^2 A \\ &= \frac{-2\sin^2 A \cos^2 A}{\sin^2 A \cos^2 A} \end{aligned}$$

$$= \frac{(\sin^2 A + \cos^2 A)^2 - 2\sin^2 A \cos^2 A}{\sin^2 A \cos^2 A}$$

$$= \frac{1 - 2\sin^2 A \cos^2 A}{\sin^2 A \cos^2 A}$$

$$= \frac{1}{\sin^2 A \cos^2 A} - 2 = \text{RHS}$$

OR

Ans. 2

35. 128.25 cm^2

Sol. $\frac{1}{4} \times \pi \times (15\sqrt{2})^2 - (15)^2$

Section - E

Case study based questions are compulsory.

36.

(i) 76.1

(ii) 77

(iii) 74

OR

Ans. 17

37. (i) $3\sqrt{2}$

(ii) $3\sqrt{2}$

(iii) 6

OR

Ans. 6

38. (i) 525cm^3

(ii) 0.36 cm^3

OR

(i) 1.54 cm^3

(ii) 523.56 cm^3