PACE
IIT & MEDICAL

Sub. : Science **Total Marks : 80**
Std. X (CBSE)

Prelim Answer Paper - 05

Section-A(Each 1 mark)

Select and write the most appropriate option out of the four options given for each of the questions 1 - 20. There is no negative mark for incorrect response.

1. In the following equation:
$Na_2CO_3 + xHCl \rightarrow 2NaCl + CO_2 + H_2O$, the value of x is

Ans : b) 2

2. The atomic numbers of four elements A, B, C and D are 6, 8, 10 and 12 respectively. The two elements which can react to form ionic bonds (or ionic compound) are:

Ans : d) B and D

3. What happens when a solution of an acid is mixed with a solution of a base in a test tube?
i) Temperature of the solution decreases
ii) Temperature of the solution increases
iii) Temperature of the solution remains the same
iv) Salt formation takes place

Ans : d) (ii) and (iv)

4. The process of conversion of veg etable oils to vegetable ghee involves:

Ans : a) Hydrogenation

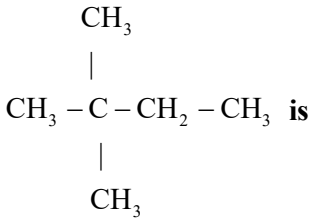
5. The metal which can be cut with a knife

Ans : a) Sodium and potassium

6. Which of the following acids are edible?
A) Citric acid B) Tartaric acid
C) Hydrochloric acid
D) Carbonic acid

Ans : b) (A), (B) and (D) are correct

7. The IUPAC name of



is

Ans : b) 2, 2-demethyl butane

8. Which of the following events in the mouth cavity will be affected if sali vary amylase is lacking in the saliva?

Ans : a) Starch breaking down into sugars.

9. Which of the following endocrine glands does not exist in pairs?

Ans : c) Pituitary

10. Along the path of the vas-deferens the secretions of which gland provide nutrition to the sperms?

Ans : b) Seminal vesicles

11. The enzymes pepsin and trypsin are secreted respectively by

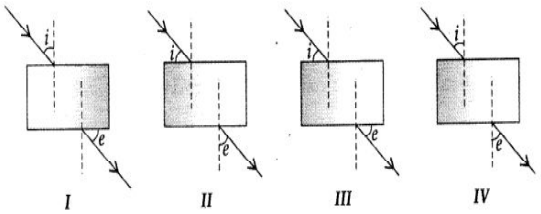
Ans : a) Stomach and pancreas

12. Which one is a possible progeny in F_2 generation of pure bred tall plant with round seed and short plant with wrinkled seeds?

Ans : d) All of the above

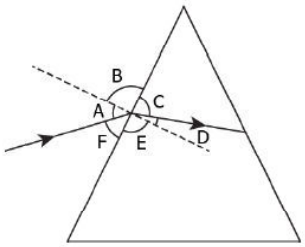
13. A student does the experiment on tracing the path of a ray of light passing through a rectangular glass slab for different angles of incidence.

He can get a correct measure of the angle of incidence and the angle of emergence by following the labelling indicated in figure:



Ans : d) IV

14. The image shows a light ray incident on a glass prism.



The various angles are labeled in the image. Which angle shows the angle of incidence and angle of refraction, respectively?

Ans : a) A and D

15. Which of the following constitute the food chain?

Ans : b) grass, goat and human

16. In food web, flow of energy is :

Ans : c) Unidirectional

Question No. 17 to 20 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

a) Both A and R are true, and R is the correct explanation of A.

b) Both A and R are true, and R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

17. Assertion(A) : Soaps are not suitable for washing purpose when water is hard.

Reason (R) : Soaps have relatively weak cleansing action.

Ans : b) Both A and R are true, and R is not the correct explanation of A.

18. Assertion(A): A receptor is a specialized group of cells in a sense organ that perceive a particular type of stimulus.

Reason (R) : Different sense organs have different receptors for detecting stimuli.

Ans : b) Both A and R are true, and R is not the correct explanation of A.

19. Assertion (A) : The resistivity of a substance does not depend on the nature of the substance and temperature.

Reason (R) : The resistivity of a substance is a characteristic property of the material.

Ans : d) A is false but R is true.

20. Assertion(A): Accumulation of harm ful chemicals is higher in case of organisms at higher trophic level.

Reason(R): Food chain normally can't reduce beyond 3 or 4 trophic level.

Ans : b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.

Section-B(Each 2 marks)

Question No. 21 to 26 are very short answer questions

21. Study the following equation of a chemical reaction:

$H_2 + Cl_2 \rightarrow 2HCl$

i) Identify the type of reaction.

ii) Write a balanced chemical equation of another example of this type of reaction.

Ans : i) Combination reaction.

ii) Another example of combination reaction is

$$\underset{\text{Sodium}}{2Na_{(s)}} + \underset{\text{Chlorine}}{Cl_{2(g)}} \longrightarrow \underset{\text{Sodium chloride}}{2NaCl_{(s)}}$$

22. i) Name the hormones that are released in human males and females when they reach puberty.

ii) Name a gland associated with brain.

Which problem is caused due to the deficiency of the hormone released by this gland ?

Ans : i) Testes in males produces hormone testosterone.Ovaries in females produces hormone oestrogen.

ii) Pituitary gland present in the brain is responsible for body growth, development of bones and muscles (if excess-gigantism) (if less-dwarfism).

23. Give reasons:

a) Ventricles have thicker muscular walls than atria.

b) Transport system in plants is slow.

Ans : a) Since ventricles have to pump blood into various organs with high pressure, they have thicker walls than atria.

b) Transport system in plants is less elaborate than in animals, as plants are less active, so their cells do not need to be supplied with materials so quickly.

OR

Draw a diagram of human excretory system and label kidneys, ureters on it.

Ans : Diagram of human excretory system is as follows:

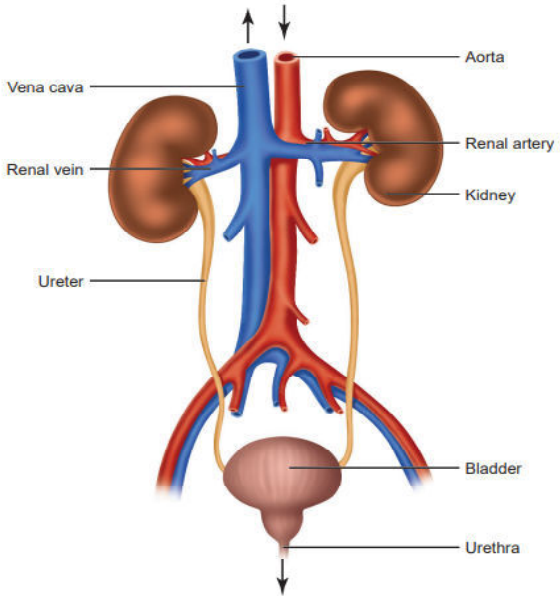


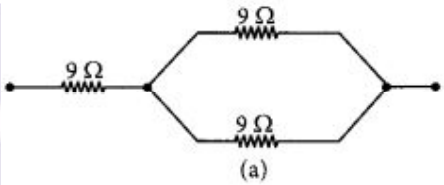
Figure 8.2 Human excretory system

24. Alloys are used in electrical heating devices rather than pure metals. Give reason.

Ans : Alloys are used in electricity heating devices rather than pure metals because Resistivity of an alloy is more and hence more heat is produced in any alloy. Moreover, alloy does not burn (or oxidize easily at higher temperature).

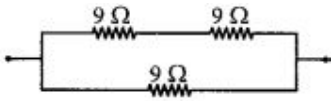
25. Show how would you join three resistors, each of resistance 9 Ω so that the equivalent resistance of the combination is (i) 13.5 Ω, (ii) 6 Ω

Ans : i) The resistance of the series combination is higher than each of the resistances. A parallel combination of two 9 Ω resistors is equivalent to 4.5 Ω. We can obtain 13.5 Ω by coupling 4.5 Ω and 9 Ω in series. So, to obtain 13.5 Ω, the combination is as shown in figure (a).



(a)

ii) To obtain a equivalent resistance of 6 Ω, we have to connect two 9 Ω resistors in series and then connect the third 9 Ω resistor in parallel to the series combination as shown in the figure (b).



(b)

OR

Two identical resistors are first connected in series and then in parallel. Find the ratio of equivalent resistance in two cases.

Ans : Let resistance of each resistor be R.

For series combination,

$Rs = R_1 + R_2$

So, $R_s = R + R = 2R$

For parallel combination,

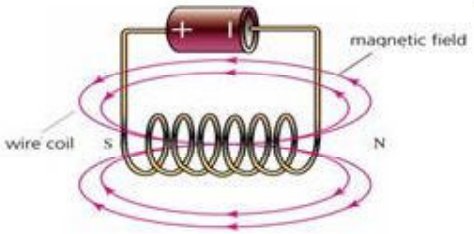
$$\frac{1}{R_p}=\frac{1}{R_1}+\frac{1}{R_2} \text{ or } R_p=\frac{R_1R_2}{R_1+R_2}$$

So, $R_p=\frac{R\times R}{R+R}=\frac{R}{2}$

Required ratio $=\frac{R_s}{R_p}=\frac{2R}{R/2}=4:1$

26. What is a solenoid? Draw magnetic field lines showing the magnetic field inside and outside the current carrying solenoid?

Ans : A solenoid is a coil of many turns of insulated copper wire closely wound in the shape of a ring.



Section-C(Each 3 Marks)

Question No. 27 to 33 are short answer questions

27. A compound X has the molecular formula C_3H_6O with structural formulaCH_3CH_2O . Give its IUPAC name. Can another compound have the same molecular formula? Give the structure and IUPAC name of that compound also.

Ans : The IUPAC name of X is propanal.

Another similar compound is Y is.

$$CH_3-\overset{\overset{O}{\|}}{C}-CH_3 \text{ (Propanone)}$$

X and Y are related to each other as functional isomers.

28. a) i) Write two properties of gold which make it the most suitable metal for ornaments.

ii) Name two metals which are the best conductors of heat.

iii) Name two metals which melt when you keep them on your palm.

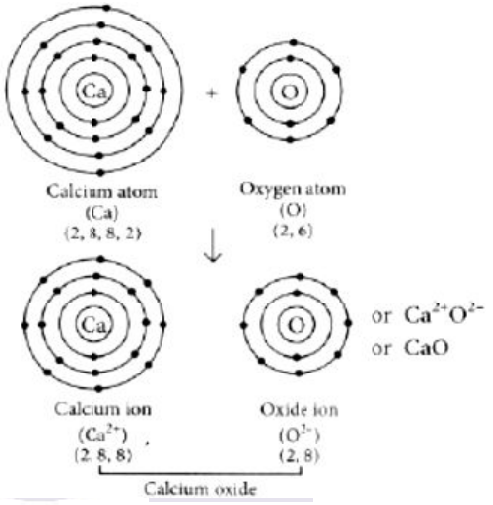
b) Explain the formation of ionic compound CaO with electron-dot structure. Atomic numbers of calcium and oxygen are 20 and 8 respectively.

Ans : a) i) The malleability and ductility properties of gold make it suitable for ornaments.

ii) Silver and gold.

iii) Gallium and caesium have so low melting points that they melt even on keeping them on palm.

b)



OR

A metal 'M' is found in nature as its carbonate. It is used in the galvanization of iron. Identify 'M' and name its ore. How will you convert this ore into free metal?

Ans : 'M' = Zinc metal

Zinc occurs as Zinc Carbonate in calamine ore, $ZnCO_3$.

Zinc can be extracted from the ore by:

i) Zinc Carbonate is first converted into Zinc Oxide by calcination. When calamine ore (zinc carbonate) is heated strongly in the absence of air, it decomposes to form zinc oxide and carbon dioxide.

$$ZnCO_3 \xrightarrow{\text{calcination}} ZnO_{(s)}+CO_2\uparrow$$

ii) Zinc metal is then extracted from zinc

oxide by reduction with carbon (coke).

$$ZnO_{(s)} + C_{(s)} \rightarrow Zn_{(s)} + CO \uparrow$$

29. Study the given data and answer the questions following the data: Parental plants cross fertilised and seeds collected First Generation offsprings Of Thprings of self pollination of Male parents always bare red flowers, Female parent always had white flowers, 330 seeds sown and observed, All 330 gave red flowers, Out of 44 seeds 33 seeds gave plants with red flowers and 11 seeds gave plants with white flowers.

i. What is the term for this type of cross?

ii. What does the data of the column marked F indicate?

iii. Express the gene type of the (a) parents (b)F_1 progeny and (c) F_2progeny

Ans : i. Monohybrid cross

ii. Red colour of flower dominant over white flower

iii. a) Parents – (RR) and (rr)

b) progeny – Rr

c) progeny – RR, Rr and rr

30. Why and how does water enter continuously into the root xylem of plants?

Ans : Xylem transports water and minerals to the plant body. The roots of a plant have hair called root hairs. The root hairs are directly in contact with the film of water in between the soil particles. Water and minerals get into the root hair by the process of diffusion. The water and minerals absorbed by the root hair form the soil pass from cell to cell by osmosis through the epidermis root cortex, endodermis and reaches the root xylem. The xylem vessels of the root the plant are connected to the xylem vessels into stem.

Therefore, the water containing dissolved minerals enter the root xylem vessels into stem xylem vessels. The xylem vessels of the stem branch into the leaves of the plants. So the water & minerals carried by the xylem vessels in the stem reach the leaves through the branched xylem vessels which enter from the petiole into the each part of the leaf. Thus the water and minerals form the soil reach through the root and stem to the leaves of the plants.

Evaporation of water molecules from the cells of a leaf creates a suction which pulls water form the xylem cells of roots. The loss of water in the form of vapour from the aerial parts of the plants is known as transpiration.

31. Calculate the magnification of the image of an object placed perpendicular to the principal axis of a concave mirror of focal length 15 cm. The object is at a distance of 20 cm from the mirror.

Ans : Given, focal length of concave mirror,

$f = -15$ cm

Object distance, $u = -20$ cm

Image distance, $v = ?$

Using mirror formula,

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

$$\text{or } \frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{-15} - \frac{1}{-20} = \frac{-4+3}{60}$$

$$\frac{1}{v} = \frac{-1}{60} \quad v = -60 \text{ cm}$$

Using magnification formula,

$$m = \frac{-v}{u} = -\left(\frac{-60}{-20}\right) \text{ or } m = -3$$

So, the magnification, $m = -3$.

32. a) List two causes of hypermetropia.

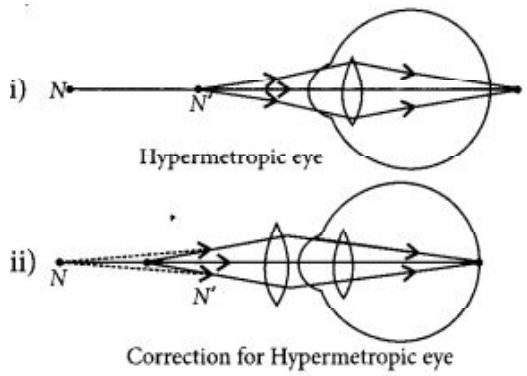
b) Draw ray diagrams showing (i) a hypermetropic eye and (ii) its correction using suitable optical device.

Ans : a) Hypermetropia is caused due to

following reasons:

i) Shortening of the eyeball

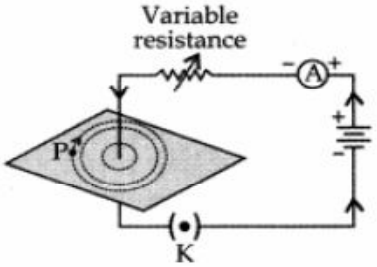
ii) Focal length of crystalline lens is too long.



33. Draw magnetic field lines produced around a current carrying straight conductor passing through cardboard. How will the strength of the magnetic field change, when the point where magnetic field is to be determined, is moved away from the straight wire carrying constant current ? Justify your answer.

Ans : i) The magnetic field lines around a straight conductor carrying resistance current are concentric circles whose centre lies on the wire.

ii) When a point where magnetic field is to be determined is moved away from the straight wire, the strength of the magnetic field decreases because as we move away from a current carrying straight conductor, the concentric circles around it representing magnetic field lines become larger and larger indicating the decreasing strength of magnetic field.



Section-D (Each 5 Marks)

Question No. 34 to 36 are long answer questions.

34. Write the chemical name of $Na_2CO_3.10H_2O$ and Na_2CO_3. Write the significance of 10H2O. Mention the term used for water molecules attached with a salt. With the help of chemical equation, explain the method of preparation of both $Na_2CO_3.10H_2O$ and Na_2CO_3. Also list two uses of $Na_2CO_3.10H_2O$.

Ans : Chemical name of $Na_2CO_3.10H_2O$: Sodium Carbonate Decahydrate

(Washing soda) Na_2CO_3:

Sodium Carbonate (Soda ash)

$10H_2O$ is the water of crystallization of sodium carbonate. Water of crystallization is the fixed number of water molecules present in one formula unit of a salt. Thus '10' water molecules are present in one formula unit of sodium carbonate.

Washing soda is produced by Solvay process, by the reaction of ammonical brine with CO_2 gas.

$$NaCl + NH_3 + CO_2 + H_2O \xrightarrow{Heat} NaHCO_3 + NH_4Cl$$

$NaHCO_3$ on heating produces Na_2CO_3 (Sodium carbonate, called soda ash) which on recrystallization produces washing soda.

$$2NaHCO_3 \xrightarrow{Heat} Na_2CO_3 + CO_2 \uparrow + H_2O$$

$$Na_2CO_3 + 10H_2O \xrightarrow{Crystallisation} Na_2CO_3.10H_2O$$

Washing soda is a basic salt.

Some important uses of washing soda:

Washing soda is used in the glass, soap and paper industries.

It is used in the manufacture of borax compound.

It is used as a cleansing agent for domestic purposes.

It is used for removing permanent hardness of water

OR

Identify the type of chemical reactions in the following processes:

i) Barium chloride solution is mixed with copper sulphate and a white 33) precipitate is formed.

ii) On heating copper powder in a china dish, the surface of copper powder becomes black.

iii) On heating green ferrous sulphate crystals, reddish brown solid is left as residue and a gas having smell of burning sulphur is evolved.

iv) Iron nails when left dipped in blue copper sulphate solution become brownish in colour and blue colour of copper sulphate solution fades away.

v) Quicklime reacts vigorously with water releasing large amount of heat.

Ans : i)

$$BaCl_{2(aq)} + CuSO_{4(aq)} \rightarrow BaSO_{4(s)} \downarrow + CuCl_{2(aq)}$$

Double displacement reaction.

Characterised by the formation of precipitate.

ii) $2Cu + O_2 \xrightarrow{Heat} 2CuO$

(Black)

In this reaction, Cu is changing into CuO. This is the addition of oxygen. So this is an oxidation reaction.

iii) When green coloured ferrous sulphate is heate d strongly, it decomposes to form brown coloured ferric oxide. A smell of burning sulphur is also obtained due to the formation of sulphur dioxide. In this reaction, one substance is splitting up into three substances so this is a decomposition reaction.

$$\underset{(Green)}{2FeSO_4} \xrightarrow{\Delta} \underset{(brown)}{Fe_2O_3(s)} + SO_2(g) + SO_3(g)$$

iv) $Fe(s) + \underset{(blue\ sol^n)}{(CUSO_4(aq)} \rightarrow \underset{(Green)}{FeSO_4(aq)} + Cu(s)$

Iron displaces Cu from copper sulphate solution as iron is more reactive than copper. Therefore this is a displacement reaction.

v) $CaO_{(s)} + H_2O_{(l)} \rightarrow Ca(OH)_2$

This is a combination reaction as two compounds quick lime and water combine to form a single compound slaked lime.

35. a) Draw a diagram of human alimentary canal and label the following parts:

i) Largest gland.

ii) Gland that secretes digestive enzymes and hormone.

iii) Part where HCl is produced.

iv) Part where digested food is absorbed.

b) What are villi? Explain their function in the digestive system.

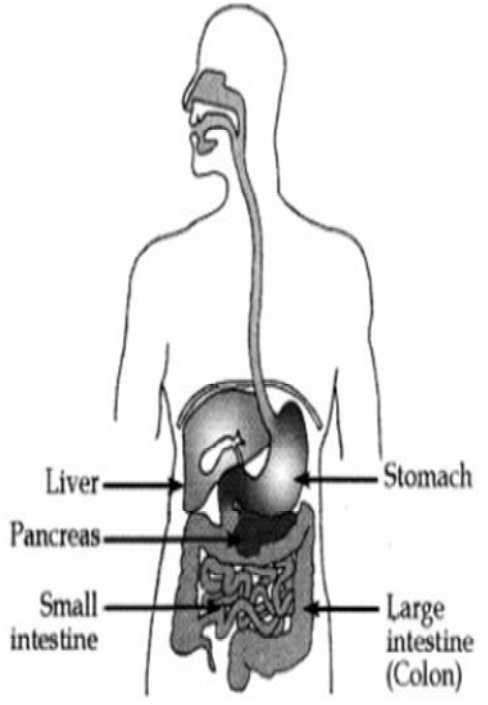
Ans : a) i) Largest gland – Liver

ii) Gland that secretes digestive enzymes and hormone – Pancreas

iii) Part where HCl is produced – Stomach

iv) Part where digested food is absorbed – Small intestine

b) The small intestine is especially adapted for absorption of digested food.



OR

Describe the structure and functioning of nephrons.

Ans : Structure of nephron. Nephron is the basic filtration unit in the kidney. It consists of a tubule which is connected with a collecting duct at one end and a cup shaped structure at the other end, called Bowman's capsule. Every

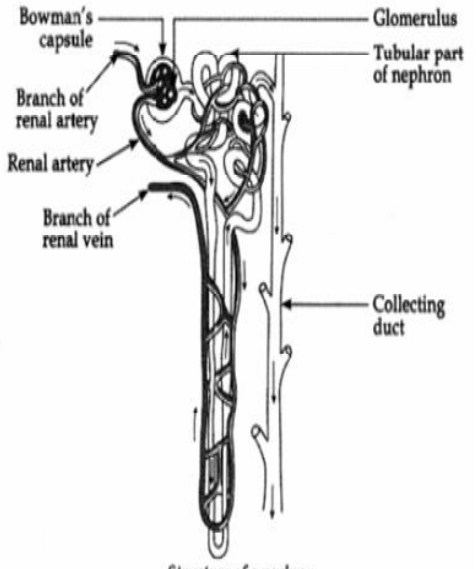
Bowman's capsule contains a cluster of capillaries called glomerulus within the cup-shaped structure. The blood enters into glomerulus through afferent arteriole of renal artery and leaves it through different arterioles.

Basic functions of Nephrons

Filtration: Filtration of the blood takes place in Bowman's capsule in the capillaries of the glomerulus. Then this filtrate passes into the tubular part of the nephron. The filtrate contains glucose, amino acids, urea and uric acid and a large amount of water.

Reabsorption: The filtrate flows along the tubule and useful substances such as glucose, amino acids, salts and some water are re-absorbed into the blood by the capillaries surrounding the nephron tubule.

Urine: The filtrate which remains after the re-absorption is called the urine, which is collected from nephron by the collecting duct to carry it to the urinary bladder and then to the urethra



Structure of a nephron

36. a) To construct a ray diagram we use two rays which are so chosen that it is easy to know their directions after reflection from the mirror. Use these two rays and draw ray diagram to locate the image of an object placed between pole and focus of a concave mirror.

b) A concave mirror produces three times magnified image on a screen. If the objects placed 20 cm in front of the mirror, how far is the screen from the object?

Ans : a) Two lights rays whose path of reflection are priorly known are :

i) When the incident ray passes through the centre of curvature of a concave mirror, it gets reflected in the same path.

ii) When the ray is incident obliquely to the principal axis, towards the pole of mirror, it gets reflected back by making equal angles with the principal axis (laws of reflections).

Suppose an object is placed between focus and pole of the concave mirror. Then by using the above two rays, the image of the object can be located as

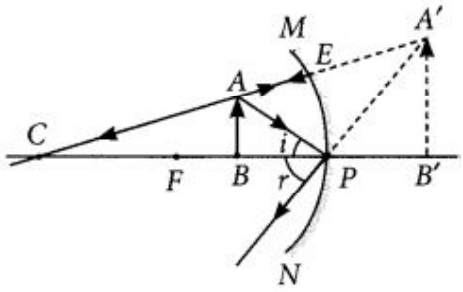


Image formed is virtual, erect, magnified and it is formed behind the mirror.

b) **Given :** Magnification, m = – 3

Object distance, u = – 20 cm

Magnification, $m = -\frac{-v}{u}$ or $-3 = \frac{-v}{-20}$

or v = -60 cm

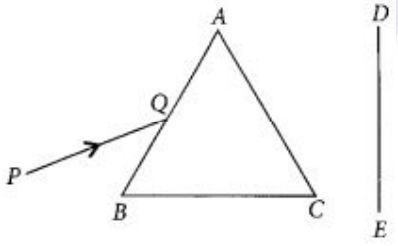
The screen is placed in front of the mirror at a distance of 60 cm from the pole.

Thus, the screen is placed 40 cm

(60cm – 20 cm) away from the object.

OR

A narrow PQ of white light is passing through a glass prism ABC as shown in the diagram. Trace it on your answer sheet and show the path of the emergent beam as observed on the screen DE.

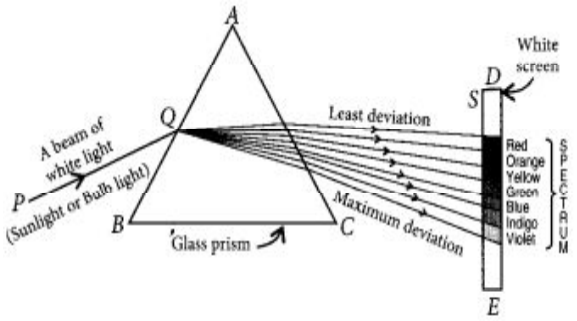


i) **Write the name and cause of the p henomenon observed.**

ii) **Where else in nature is this phenomenon observed?**

iii) **Based on this observation, state the conclusion which can be drawn about the constituents of white light.**

Ans:



i) The phenomenon of the splitting up of the white light into its constituents colours iscalled dispersion of light. Dispersion of lightis caused due to, different constituents colours of light after different refractive indices to the material of the prism.

ii) The formation of rainbow is caused by the dispersion of the white sunlight into its constituent colours.

iii) Based on the dispersion of white light into its constituents colours, we can conclude that

a) The white light consists of seven colours.

b) The violet light Millers maximum deviations and the red light suffers minimum deviation.

SECTION - E(Each 4 marks)

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. Read the following paragraph and answer the following question

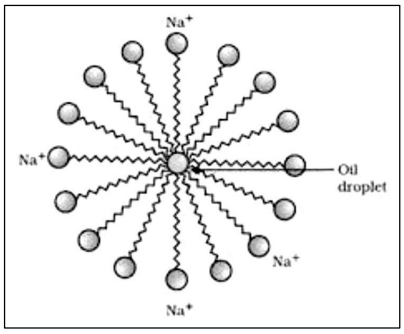
Most dirt is oily .....
..... clothes clean

i) What is hydrophobic end? 1

Ans : Soap molecules have two ends in which one is hydrophobic end which interacts with hydrocarbons and do not dissolve in water.

ii) Draw the structure of micelle. 1

Ans :



Formation of micelles

iii) What is hard water? 2

Ans : The water which contains Calcium and magnesium salts in it and form insoluble precipitates when treated with soap are called hard water.

OR

To remove hardness of water, the water is treated with soap or detergent?

Ans : Detergent are effective in hard water as they contain sodium salts of sulphonic acid or ammonium salts with chlorides or bromides ions etc.

38. Read the following paragraph and answer the following question

When a girl is born, ...
..... through the cervix.

i) What is fertilization? 2

Ans : The fusion of male gametes(sperms) and the female gametes(egg) to form zygote is called fertilization.

OR

What is placenta?

Ans : It is an special tissue which provide nutrition from mother's blood to developing embryo.

ii) What are the different parts of female reproductive system? 1

Ans : Fallopian tube, ovary, uterus, vagina and cervix.

iii) What happens when egg is not fertilized? 1

Ans : If the egg is not fertilized, the thick lining of uterus is not needed. So, it breaks slowly and comes out through vagina as blood and vagina, which is called as menstruation.

39. Read the following paragraph and answer the following question

There are various .....
-------- refraction of light.

i) Rainbow formation takes place because of which phenomenon related to light?

Ans : Rainbow is formed because of total internal reflection of light, dispersion of light and refraction of light.

ii) What is mean by total internal reflection?

Ans : When a ray of light travels from one medium to other, if the angel of incidence is greater than the critical angle then the incident light get reflected totally in the same medium is called as total internal reflection.

iii) Why atmospheric refraction occurs?

Ans : The atmosphere contains different layers which contains hot and cold air. The hotter air is lighter than the cooler air. And hence the refractive index of hot air is less than the cooler air. As there is continuous change in refractive index of different layers of atmosphere, the atmospheric refraction takes place.

OR

For which colour the angle of deviation is more in case of dispersion?

Ans : The angel of deviation is more for violet colour. And it decreases from violet to red in VIBGYOR.

* * *