

Science*Time Allowed: 3 hours**Maximum : 90***General Instructions:**

- (i) The question paper comprises two sections, A and B. You are to attempt both the sections.
- (ii) All questions are compulsory.
- (iii) There is no choice in any of the question.
- (iv) All questions of Section-A and B are to be attempted separately.
- (v) Question numbers 1 to 3 in Section - A are one mark question. They are to be answered in one word or in one sentence.
- (vi) Question numbers 4 to 6 in Section - A are two marks questions. These are to be answered in 30 words each.
- (vii) Question numbers 7 to 18 in Section - A are three marks questions. These are to be answered in about 50 words each.
- (viii) Question numbers 19 to 24 in Section-A are 5 marks questions. These are to be answered in 70 words each.
- (ix) Question numbers 25 to 33 in Section- B are multiple choice questions based on practical skills. Each question is a one mark question. You are to select one most appropriate response out of the four provided to you.
- (x) Question numbers 34 to 36 in Section B are two marks questions based on practical skills. These are to be answered in brief.

SECTION A

- 1 Name the process of converting vegetable oil to vegetable ghee. 1
- 2 Give reason for the statement- Since the ovary releases one egg every month, the uterus also prepares itself every month by making its lining thick and spongy. 1
- 3 Name the component of white light that has the greatest wavelength. 1
- 4 Which natural resource are the biodiversity hot spots? Suggest what happens when there is a loss of biodiversity? 2
- 5 Write the name and molecular formula of an organic compound having its name suffixed with „-ol and having two carbon atoms in the molecule. With the help of a balanced equation indicate what happens when its heated with excess of conc. H_2SO_4 . 2
- 6 A cube of edge 6 cm is placed over a printed page. At what distance from the top surface of cube will the letters appear when seen from above? Refractive index of glass is 1.5 2
- 7 What is meant by isomers? “We can not have isomers of the first three members of alkane series” give reason to justify this statement. Draw the structures of two isomers of pentane, C_5H_{12} . 3

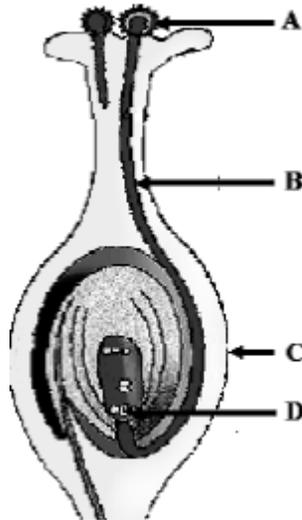
- 8 i) Name the following: 3
- a) Third member of aldehyde series
- b) Second member of carboxylic series
- ii) Write the IUPAC name of the following:
- a)
$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$$
- b)
$$\begin{array}{cccc} \text{H} & \text{OH} & \text{H} & \text{H} \\ | & | & | & | \\ \text{H} - \text{C} & - \text{C} & - \text{C} & - \text{C} - \text{H} \\ | & | & | & | \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$$
- 9 Four elements A, B, C and D have atomic numbers 12, 13, 14 and 15 respectively. Answer the following questions giving reasons - 3
- i) What is the number of valence electrons and valency of D?
- ii) Which of them will have largest atomic radii?
- iii) Which of these elements will form the most basic oxide?
- 10 Differentiate between combustion and oxidation reactions of ethanol. 3
- 11 In a germinating seed, which parts are known as future shoot and future root? Mention the function of cotyledon. 3
- 12 What is placenta? Write any two major functions of placenta. 3
- 13 Different species use different strategies to determine sex of a newborn individual. It can be environmental cues or genetically determined. Explain the statement by giving example for each strategy. 3

- 14** A 2 cm high object is placed at a distance of 32 cm from a concave mirror. **3**
The image is real, inverted and 3 cm in size. Find the focal length of the mirror and the position where the image is formed?
- 15** A child while playing with his father's spectacles burnt a hole in a piece of **3**
paper by focusing a small image of the sun on it.
(i) What defect of vision his father is suffering from?
(ii) Write two causes for this defect?
(iii) Draw a ray diagram to show image formation by the defective eye?
(iv) Draw a ray diagram showing corrected eye using proper lens.
- 16** Explain the formation of rainbow in the sky with the help of a diagram. **3**
List the three phenomena involved in proper sequence.
- 17** Which types of people are benefited from the development of different **3**
resources? Why do we need to use the resources carefully?
- 18** Write any three characteristics of a food chain. Dharmesh always treated **3**
the chemical effluent before disposing it in the water body. Mention any three moral values possessed by Dharmesh.
- 19** In the following table. Six elements A, B, C, D, E and F of the modern **5**
periodic table with atomic numbers 3 to 18 are given:

3	4	5	6	7	8	9	10
A					E		G
11	12	13	14	15	16	17	18
B	C		D			F	

- a) Which of these is i) Noble gas ii) halogen
b) Which of these is the most active metal in 3rd period?
c) Identify the most electronegative element in the third period.
d) In the compound between B and F what type of bond will be formed?
e) What would be the nature of oxide formed by C?

- 20** A. Draw a longitudinal section of a flower and label the following parts – **5**
- a) Part that develops into a fruit
 - b) Part that produces pollen grain
 - c) Part that transfers male gametes
 - d) Part that is sticky to trap
- B. Name the parts labeled A, B, C, D in the diagram given below:



- 21** A. How does speciation take place? **5**
- B. Define the term GENE.
- C. The gene for red hair is recessive to the gene for black hair. What will be the hair colour of a child if he inherits a gene for red colour from his mother and a gene for black hair from his father? Express with the help of flow chart.
- 22** A. Mention any two point of difference between acquired and inherited traits. **5**
- B. If the tail of a mouse is cut for twenty one generations, will the tail occur in the twenty second generation of that mouse? Give reason to support your answer.
- C. Define the term – Natural Selection.

- 23** (i) Rohit claims to have obtained an image twice the size of object with a concave lens. Is he correct? Give reason for your answer. **5**
- (ii) Where should an object be placed in case of a convex lens to form an image of same size as of the object? Show with the help of ray diagram the position and the nature of the image formed.
- (iii) With the help of ray diagram, illustrate the change in position, nature and size of the image formed if the convex lens in case of (ii) is replaced by concave lens of same focal length.
- 24** (i) Which property of concave mirror is utilized for using them as shaving mirrors? **5**
- (ii) Light passes through a rectangular glass slab and through a triangular glass prism. Using proper ray diagram, explain in what way does the direction of the two emergent beams differs with respect to the incident beam of light.
- (iii) A concave lens has a focal length of 50 cm Calculate its power.

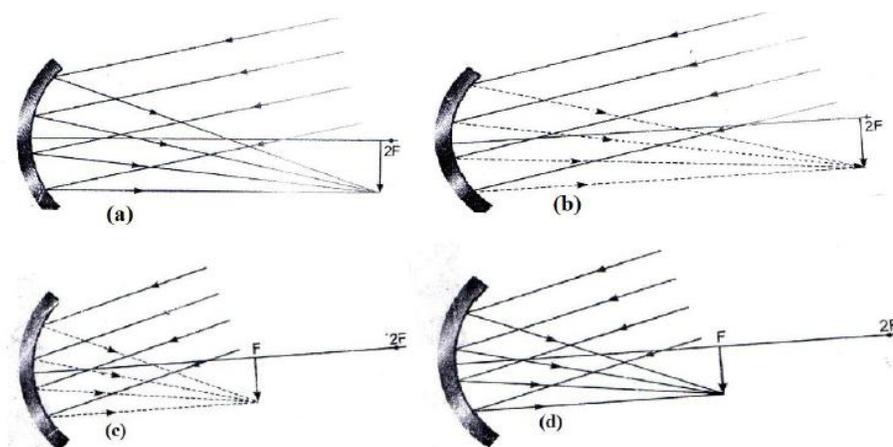
SECTION B

- 25** A student is given equal amount of three samples A, B and C of water with temporary hardness. He keeps the three samples at different temperatures. A at room temperature, B at 50 °C and C at 80 °C. Which sample will give maximum amount of lather with soap solution? **1**
- a) A
- b) Both B and C
- c) Only C
- d) Both A and B
- 26** Soaps are formed by alkaline hydrolysis of **1**
- a) Carboxylic acids
- b) Esters of long chain fatty acids
- c) Esters of small chain

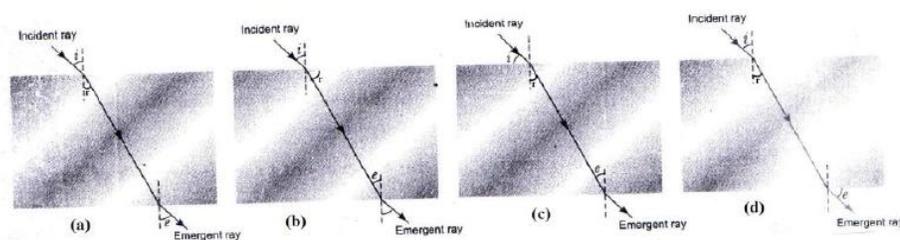
d) Inorganic acids

- 27 On addition of Na_2CO_3 to hard water 1
- a) the foaming capacity increases
 - b) the foaming capacity decreases
 - c) the foaming capacity increases then decreases
 - d) the foaming capacity decreases then increases

- 28 In finding the focal length of a distant object by concave mirror, you are 1
required to draw the ray diagram of nature.



- 29 While performing the experiment to trace the path of a ray of light passing 1
through a rectangular glass slab, four students labeled their ray diagrams
in the manner shown below. The correct labeling has been done by
students.



- 30 A convex lens forms a virtual image when an object is placed at a distance 1
of 20cm from it. The focal length
- (a) $f = 40$ cm
 - (b) $f = 20$ cm
 - (c) $f > 20$ cm
 - (d) $f < 20$ cm

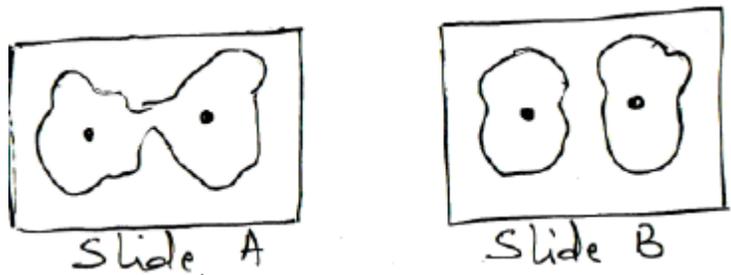
31 In a dicot seed, the pore through which the seed absorbs water during seed germination is called 1

- a) Micropyle
- b) Hilum
- c) Funicle
- d) Radical

32 For the experiment – To prepare temporary mount of yeast to study budding process; Yeast granules are made to first grow by adding them to 1

- a) Hydrochloric acid
- b) Distilled water
- c) 10% sugar solution
- d) Alcohol

33 Two slides were shown to four students, and they labeled them as following. 1



Student	Slide A	Slide B
I	Budding in Yeast	Binary fusion in Amoeba
II	Binary fission in Amoeba	Buds of Amoeba
III	Binary fission in Amoeba	Daughter cells of Amoeba
IV	Budding in Amoeba	Daughter cell of Yeast

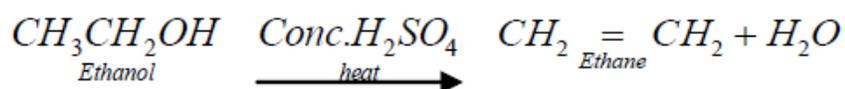
The student who made the correct labeling is:

- a) II
- b) I
- c) IV
- d) III

- 34** With regard to turnip, carrot, sweet potato and potato, three belong to the same category. Identify those three modifications and mention whether they are homologous or analogous. Also mention the reason why the fourth modifications do not belong to the same category. 2
- 35** A student has to perform an experiment on tracing the path of a ray of light passing through a rectangular glass slab for three different angles of incidence. Two of his friends suggest the following options to him: 2
- (A) Draw the incident rays corresponding to 20° , 50° and 70° as angles of incidence and fix the two pins on the incident ray just 2 cm apart.
- (B) Draw the incident rays corresponding to 30° , 45° and 60° as the angles of incidence and fix two pins on the incident rays nearly 8 cm apart. Which is the better option he should follow?
- Give reason in support of your answer.
- 36** A student obtained a sharp image of a lighted candle on a screen using a convex lens. Now he wants to focus a distant lamp on a far away electric pole. In which direction should the lens be move for this purpose with respect to the screen, to get a sharp image on the screen? Justify your answer. 2

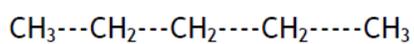
Answer Key

- 1 Hydrogenation
- 2 Required for nourishing the embryo if fertilization takes place and reaches the uterus.
- 3 Red
- 4 Forests Loss of ecological stability
- 5 Its ethanol, its molecular formula is C₂H₆O and structural formula is C₂H₅OH (CH₃CH₂OH)

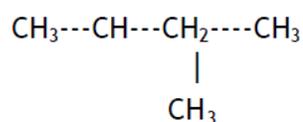


$$6 \quad \frac{\text{Real depth}}{\text{Apparent depth}} = \mu \quad \therefore \text{App depth} = \frac{6}{1.5} = 4\text{cm}$$

- 7 Isomers are those compounds which have same molecular formula and different structural formula. In first three members of alkane, branching is not possible, therefore isomers are not possible.



Pentane



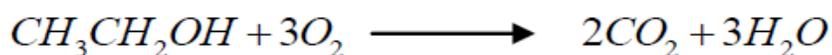
2-methyl butane

- 8
 - i)
 - a. Third member of aldehyde series- Propanal (CH₃CH₂CHO)
 - b. Second member of Carboxylic series- Ethanoic acid (CH₃COOH)
 - ii)
 - a. 2,2-dimethyl propane

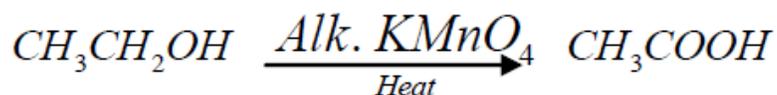
b. 2 Butanol

- 9 i) Valence electrons in 'D' - 5
Valency of 'D' - 3
ii) 'A' will have largest atomic radii.
iii) 'A' will form the most basic oxide as it is most metallic.

- 10 Complete burning of ethanol in the presence of excess of oxygen to give carbon dioxide and water is called combustion.



Addition of oxygen to ethanol in the presence of oxidizing agents to give ethanoic acid is called oxidation.



- 11 Future shoot – Plumule Future root – Radicle Cotyledon – Store food for the future plant or embryo
- 12 A disc shaped organ or special tissue in the uterus of pregnant mammal, nourishing and maintaining the foetus through the umbilical cord.
Any other definition Functions of placenta: (Any two)
a) Provides large surface area for glucose and oxygen to pass from mother to the embryo.
b) Removal of waste generated in the developing embryo into the mothers blood or any other
- 13 Environmental Cue –
a. In some animals, the temperature at which fertilized eggs are kept determines whether the developing animal in egg is male or female
b. In some animals like snail, individual can change sex.

Genetical Cue – A child who inherits an x chromosome from her father will be a girl and one who inherits a y chromosome from the father will be a boy.

$$m = \frac{-v}{u} = \frac{h_e}{h_o} \quad h_e = -3\text{cm} \quad h_o = 2\text{cm} \quad u = -32\text{cm}$$

$$m = \frac{h_e}{h_o} = \frac{-3\text{cm}}{2\text{cm}} = -1.5 \quad \text{or} \quad = \frac{-v}{u} = -1.5$$

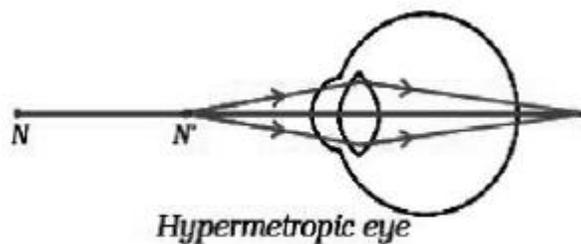
$$\therefore v = -48\text{cm}$$

$$\text{also } \frac{1}{f} = \frac{1}{v} + \frac{1}{u} = \frac{1}{-48} + \frac{1}{-32} = -\frac{5}{96}$$

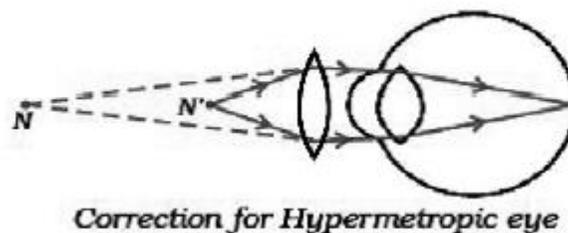
$$\therefore f = -19.2\text{cm}$$

\therefore focal length of concave mirror is 19.2cm and image is formed 48 cm in front of it

- 15 (i) Hypermetropia
 (ii) This defect arises because either
 (a) focal length of eye lens is too large or
 (b) the eyeball becomes too short.
 (iii)



- (iv)



16 The water droplets act like small prisms. They refract and disperse the incident sunlight, then reflect it internally and finally refract it again when it comes out of rain drop. Due to dispersion and internal reflection of light, different colours reach the observer's eye along different pairs. Therefore the three phenomena involved are refraction, dispersion, internal reflection of light.

17 Rich & Powerful people are benefited – We need to use resources carefully because –

- a. they are not unlimited
- b. the demand is increasing

due to human population rate increase because of improved health care –

- a. for sustainable development
- b. any other (Any two)

18 A.

(i) Unidirectional

(ii) Helps in understanding the food relationship and interaction among various organisms in an ecosystem

(iii) Helps to understand movement of toxic substances and the problem of their biological magnification

B.

(i) Sensitive towards environment

(ii) Possess knowledge about biological magnification

(iii) Scientific temperament

(iv) Conscious

(Any three)

19 a) Noble gas- G

Halogen - F

b) Most active metal – B

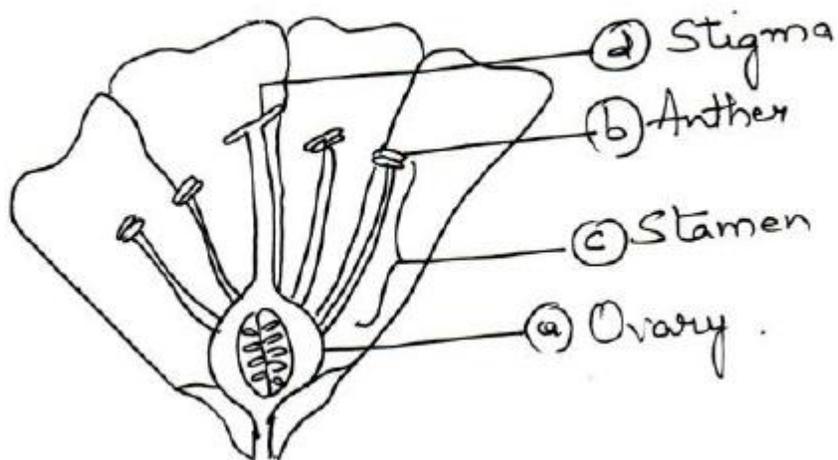
c) Most electronegative in 3rd period- F

d) Ionic bond

e) Oxide formed by C would be basic.

20

A.



B. A – Pollen grain

B – Pollen tube

C – Ovary

D – Female gamete

21

A. Speciation may take place by

(i) Migration

(ii) Natural selection

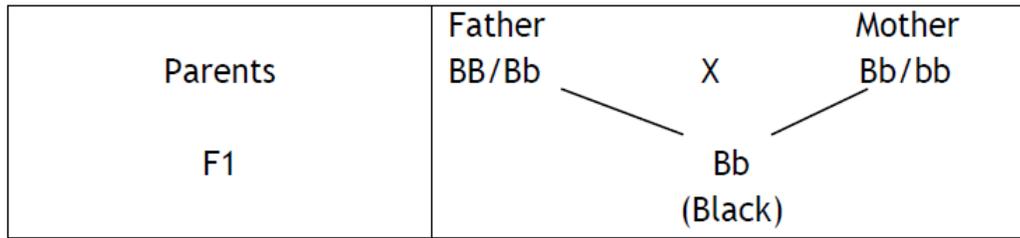
(iii) Mutation

(iv) Genetic Drift

B. Segment of DNA which is functional and are made of nucleic acids and protein

C. Given

Red hair – Mother – Recessive \therefore bb Black hair – father Dominant \therefore BB



Thus, the child will have black hair

22

A.

	Acquired Traits	Inherited Traits
1	Trait acquired during its lifetime	Traits inherited from its predecessors
2	Not inheritable	Inheritable
3	Not present in the genetic make up	Present in the genetic makeup
4	Change in DNA will not result in any change in such traits	Change in DNA will bring about change in such traits

(Any two difference)

B. The mouse continue to have information for presence of tail in its DNA

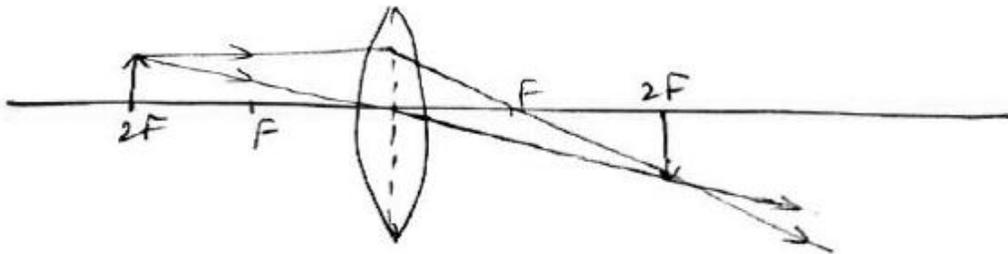
So, will continue to have tail, because it is an acquired trait

C. Nature selects the best trail in a species, leading to survival of fittest and evolution of species

23

(i) No, magnified image of an object cannot be formed by a concave lens ever.

(ii) At 2f.



(iii)

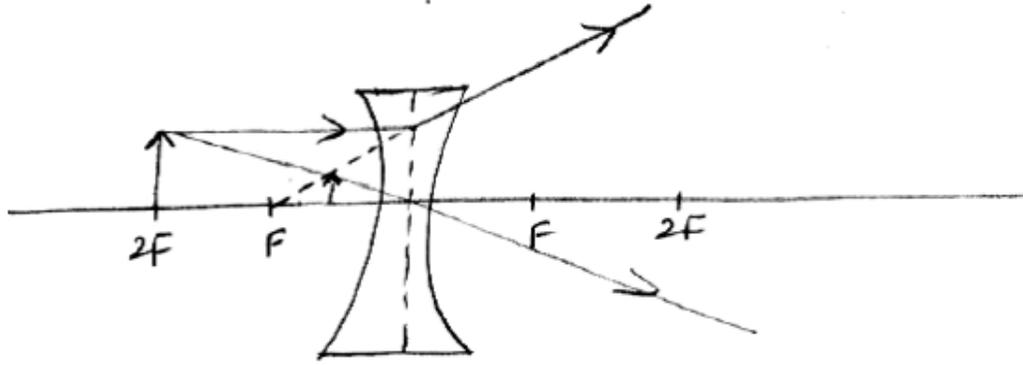
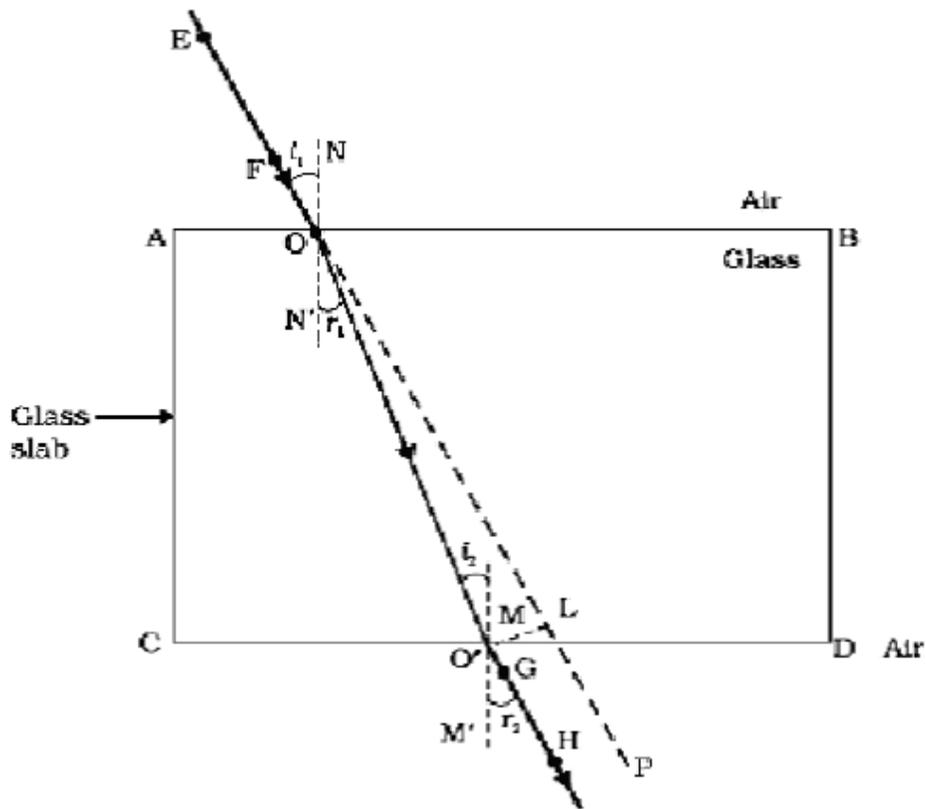
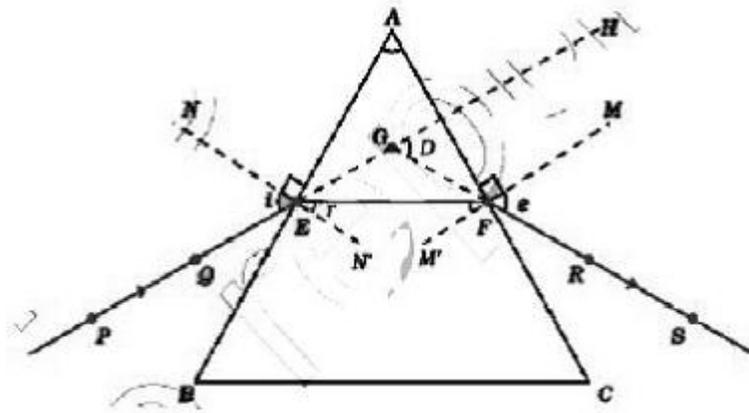


Image obtained is virtual, erect and diminished in case of concave lens

- 24 (i) When an object is placed between the pole and focus of concave mirror a magnified, erect and virtual image is obtained.
- (ii) For glass slab refer:



For prism refer:



In case of a rectangular glass slab, emergent rays of light are always parallel to the direction of incident rays. Whereas when an incident light passes through a prism, it bends towards the base of the prism hence incident ray and emergent ray are not parallel to each other.

$$(iii) \quad f = -50cm \quad p = \frac{100}{f} D = \frac{100}{-50} = -2D$$

25 c) Only C

26 b) Esters of long chain of fatty acids

27 a) Foaming capacity increases

28 d) parallel beam of light, after reflection meet at focus

29 a)

30 c) when the object is placed between F and P, virtual image is obtained

31 a) Micropyle

32 c) 10% sugar solution

- 33** d) III
- 34** Turnip, Carrot, Sweet Potato – are modified root – Homologous organs Potato – modified stem.
- 35** B, for better result, the angle of incidence should be in the range 30° – 60° and larger separation between pins will give better collinearity of pin and accuracy of result.
- 36** He should move the lens towards the screen. As the distance of object increased, the image formed by a convex lens will be more close to the focus.