

Class: 10
Subject: Science
Topic: OASK1510SA203
No. of Questions: 36

Time: 3 Hrs.

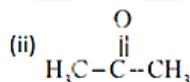
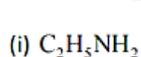
M.M. 90

General Instructions

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

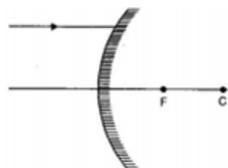
SECTION – A

Q1. Name the classes of organic compound represented by the following formula:

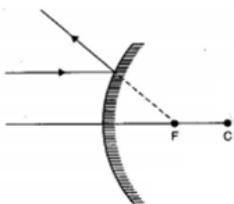


Sol. (i) Amines, (ii) ketones

- Q2. A ray of light incident on a convex mirror as shown in figure. Redraw the diagram after completing the path of the light ray after reflection from the mirror.



Sol.



- Q3. Name any two non- biodegradable wastes.

Sol. DDT and polythene bags.

- Q4. Why is K more reactive than Li?

Sol. K is larger in atomic size, therefore, it can lose electrons easily due to less force of attraction between valence electrons and nucleus than Li.

- Q5. What are fossils? Of what interest are fossils to the evolutionary biologist?

Sol. A fossil is the remnant or impressions of an organism that lives in the remote past e.g. Archaeopteryx.

Use of fossils:

- (i) The fossil record has helped in building the broad historical sequence of biological evolution.
- (ii) Phylogeny, the evolutionary history can be reconstructed from fossils.
- (iii) The habits, habitat and behavior of extinct organism can be inferred from well preserved fossils.

Q6. With respect to air, the refractive index of ice is 1.31 and that of rock salt is 1.54. Calculate the refractive index of rock salt with respect to ice.

Sol.

$$\begin{aligned} \mu_{\text{air}} \mu_{\text{ice}} &= 1.31, \mu_{\text{air}} \mu_{\text{rock}} = 1.54 \\ \mu_{\text{air}} \mu_{\text{rock}} &= \frac{\mu_{\text{air}} \mu_{\text{rock}}}{\mu_{\text{air}} \mu_{\text{ice}}} = \frac{1.54}{1.31} = 1.18 \end{aligned}$$

Q7. Give three drawbacks (limitations) of Mendeleev's Periodic Table.

- Sol.
- (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 or atomic masses could not be maintained.
 - (c) Some elements with similar properties were kept in different groups whereas some elements with dissimilar properties were kept in same group.

Q8. 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?

- Sol.
- (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.

Q9. Name the two laws of inheritance postulated by Mendel?

- Sol.
- (a) The Law of Segregation
 - (b) The law of Independent Assortment

Q10. List any two common methods by which solid wastes of urban areas are disposed off?

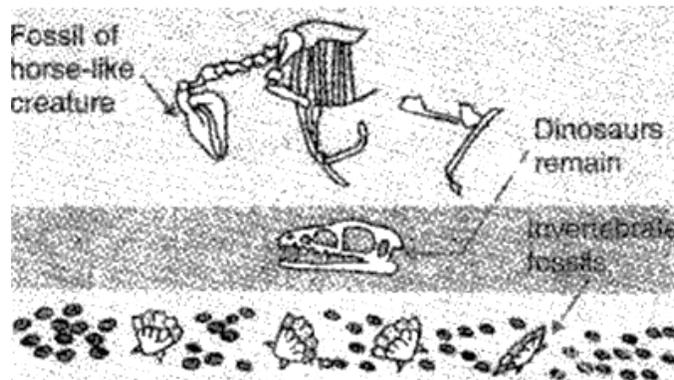
Sol. Methods are:

- (a) Bury in landfills
- (b) Composting
- (c) Recycle
- (d) Incineration (waste treatment)

Q11. How are fossils formed?

Sol. Fossils are formed layer by layer in the earth's crust.

- 100 millions ago invertebrates that were dead on the sea bed were buried in the sand and with time more sands accumulated and sandstones are formed.
- After million years, the dinosaurs living in the area die and get buried in mud which are compressed into rocks above the earlier invertebrate fossils.
- But much later, due to erosion, the water flow wears some of the rocks and the horse – like fossils are exposed and as we dig into deeper layers the older fossils are found.



**Layer by Layer fossil formation
beneath the earth's crust**

Q12. Explain with an example. How evolutionary relationship linked to classification?

Sol. Evolutionary relationship is linked with classification in the following ways:

- The more common characteristics two species have, the more closely they are related.
- The closer the species are, the more nearer they have a common ancestor.
- For example, a brother and a sister are closely related and they have a common ancestor, their parents in the first generation.

- A girl and her first cousin are closely related but less related than her brother. The cousins have a common ancestor, their grandparents in the second generation. Thus, evolutionary relationships are traced in the classification of organisms.

Q13. The radius of curvature of a convex mirror used on a moving automobile is 2.0 m. A truck is coming behind it at a constant distance of 3.5 m. Calculate (i) the position and (ii) the size of image relative to the size of truck. What will be the nature of image?

Sol. For convex mirror, Given: $R = 2.0$ m, $u = -3.5$ m

$$(i) \quad \frac{1}{f} = \frac{1}{u} + \frac{1}{v} \quad \Rightarrow \quad \frac{2}{R} = \frac{1}{u} + \frac{1}{v} \quad \left[\because f = \frac{R}{2} \right]$$

$$\Rightarrow \frac{1}{v} = \frac{2}{R} - \frac{1}{u} = \frac{2}{2} - \frac{1}{(-3.5)} = 1 + \frac{10}{35} = \frac{9}{7}$$

$$\Rightarrow v = +\frac{7}{9} \text{ m}$$

Since v is positive so image is formed behind the mirror and it is virtual.

$$(ii) \quad \text{Magnification (m)} = \frac{h'}{h} = \frac{-v}{u} \quad \Rightarrow \quad h' = \frac{-v}{u} \times h = \frac{-\left(\frac{7}{9}\right)}{(-3.5)} \times h = \frac{2}{9} h < 1$$

\therefore Size of image is $2/9$ times the size of object i.e. diminished in size.

Q14. Define (i) regular reflection and (ii) diffused reflection. List the difference between them.

Sol. (i) **Regular reflection:** When the beam of light falls on any polished or smooth surface, it gets reflected in only one direction. This phenomenon is known as regular reflection.

(ii) **Diffused reflection:** When the light falls on any uneven surface, it gets scattered back in all the directions. This phenomenon is known as diffused reflection.

Difference between Regular and Diffused reflection:

Regular Reflection	Diffused Reflection
(a) $\angle i = \angle r$	(a) $\angle i \neq \angle r$
(b) Reflection takes place from smooth surface.	(b) Reflection takes place from uneven surface.
(c) Reflected rays are parallel to each other.	(c) Reflected rays are not parallel to each other.

Q15. "Industrialization is one main cause of deterioration of environment" Discuss.

Sol. Industrialization is one main cause of deteriorating of our environment. The main reasons are:

- (i) **Noise pollution:** Pollution caused by machines in the factories disturbs the environment.
- (ii) **Industrial waste:** It is the main cause of water pollution. Plastic, cans, aluminum etc. are highly toxic and major pollutant of our environment.
- (iii) **Poisonous gases:** SO_2 , NO_2 and other toxic gases emitted by industries pollute the air.
- (iv) **Thermal pollution:** It is caused by hot water released from factories. This hot water kills many aquatic plants and animals and thus affects aquatic flora and fauna.
- (v) **Acid rain:** Oxides of Nitrogen and Sulphur emitted by industries causes' acid rain. This rain damages historical monuments and pollutes water.
- (vi) **Radioactive wastes:** Radioactive wastes are produced from nuclear reactors in the laboratories. They should be set up away from the cities.

Q16. Write the cause of depletion of ozone layer in the atmosphere.

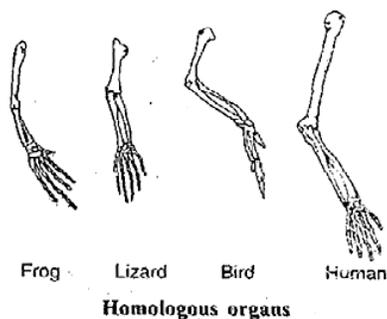
Sol. **Causes of depletion of ozone layer:** There are several reasons for depletion of ozone layer:

- The foremost is the use of chlorofluorocarbons (CFCs). The other factor responsible for ozone destruction is the pollutant nitrogen monoxide (NO).
- When the harmful chemicals like chlorofluorocarbons (CFCs) are released into the air, it accumulates in the upper atmosphere and reacts with ozone resulting in reduction of the ozone layer by forming a hole.
- Thus, the ozone layer in the atmosphere become thinner and gets depleted allowing more ultraviolet rays to pass through the earth.
- The Antarctic hole in ozone layer is caused due to chlorine molecules present in chlorofluorocarbons (CFCs) that are used by human beings.

Q17. What are homologous organs? How do they provide evidence in support of evolution?

Sol. **homologous organs** are those organs which have the same basic structural design and developmental origin but have different functions and appearance.

Example: The forelimb of a frog, a lizard, a bird and a man seem to be built from the same basic design of bones, but they perform different functions.



Q18. Explain how a new species is generated.

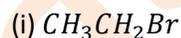
Sol. When a population of a species splits into two, it cannot reproduce with each other and then a new species is generated. For example:

- A huge population of beetles fed on bushes spread a wide mountain range.
- Individual beetles however feed on nearby bushes.
- There is sub – population of beetles in a neighborhood and reproduction takes place within the sub-population. Occasionally a migrant beetle enters a different sub – population and reproduces with them, thus genes of the migrant beetle enter a different sub-population and recombine with them, thus genes of the migrant beetle enter in a new population.
- Change due to genetic drift and natural selection will result in isolation of two sub – population which becomes more and more different from each other.
- Ultimately these two groups will be incapable of reproducing with each other and two generations of beetles are being generated.

Q19. (a) Write the name and symbol of alkali metal with the smallest atomic number.

(b) Which element has atomic number 14? Give its valency.

(c) Write IUPAC name of the following:



(d) Give one example each of (i) diprotic acid, (ii) triprotic acid.

(e) What is meant by catenation? Why does carbon show catenation to maximum extent?

Sol. (a) Lithium is alkali metal with smallest atomic number. Its symbol is 'Li'.

(b) Silicon has atomic number 14. Its electronic configuration is 2, 8, 4. Its valency is 4.

(c) (i) Bromoethane, (ii) But – 1 – yne

(d) (i) H_2SO_4 is diprotic acid (ii) H_3PO_4 is triprotic acid.

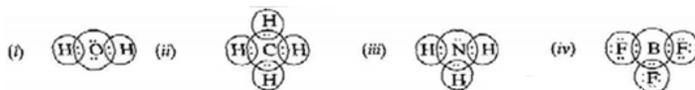
(e) Catenation is property due to which an element can form covalent bonds with atoms of same element. Carbon shows catenation to maximum extent due to small size and it can form strong covalent bonds.

- Q20. (a) Name two element of group 13.
(b) Name most electro – negative elements in periodic table. Write its atomic number.
(c) Draw electron dot structure of (i) H_2O (ii) CH_4 (iii) NH_3 (iv) BF_3
(d) Differentiate between ores and minerals

Or

- (a) Name element of group 2 belonging to 3rd and 4th period.
(b) Name the elements having highest ionization energy in periodic table.
(c) Give limitation of Dobereiner's law of triads.
(d) Why do ionic compound not conduct electricity in solid state?
(e) Name the chief ore of iron. Give its formula.

- Sol. (a) Boron and Aluminum
(b) Fluorine is the most electronegative element in periodic table. Its atomic number is 9.
(c)



(d) Ores are rocky materials which contain sufficient quality of mineral that metal can be extracted profitably. Minerals are naturally occurring substance from which metal may or may not be extracted profitably

Or

- (a) Element belonging to group 2 and 3rd period is Magnesium (Mg) and 4th period is Calcium (Ca).
(b) Helium is element which has highest ionization energy in periodic table.
(c) He could not classify all the elements discovered at that time. He could classify only few elements into triads.
(d) It is because in solid state, ions are not free to move, therefore it does not conduct electricity.
(e) The chief ore of iron is hematite. Its formula is Fe_2O_3

Q21. Answer the following questions

- (i) What are the two kinds of natural resources?
- (ii) What changes can you make in your habits to become more environments friendly?

Sol. (i) Renewable and Non – renewable natural resources.

(ii) To become more environments friendly we should follow the 3R's (Reduce, Recycle and Reuse).

(a) Reduce: It means minimization of natural resources. We may do the following:

- (i) Switch off lights, fans which are not required.
- (ii) Repair leaking taps and save water.
- (iii) Encourage solar cooker use and reduce LPG use.

(b) Recycle: Instead of extracting or creating new products from raw materials, we can collect old and used material (e.g. plastic, paper, metal, glass etc.) and recycle them to build products.

(c) Reuse : Reuse is better than recycle since recycling use some energy, which can be save if we reuse the things again. E.g. bottle of consumed food products can be used to store things like salt, sugar, tea leaves etc.

(d) Educate and Create Awareness: We should educate our neighbored about environmental issues and take collateral measures collectively. E.g. we can help other in planting trees in our neighborhood.

Q22. Answer the following questions

- (a) Define Ecosystem.
- (b) Is garden an example of Ecosystem?
- (c) Give examples of natural ecosystems.

Sol. (a) An environment comprises of all living (biotic) and non – living (abiotic) things that occur naturally on the Earth of any of its region. All these living organisms interact with each other and their growth, reproduction and other activities are effected by the abiotic components of ecosystem.

(b) Yes, In an garden all biotic components (e.g. plants, trees, animals like rats, frogs, birds, insects etc.) interact with each other and with abiotic compound (garden , soil, water etc.) for their growth and reproduction and other activities. Thus garden forms as ecosystem.

(c) Forest, ponds, lakes, sea, oceans, coral reefs, rivers etc.

- Q23. (i) Define: (a) Centre of curvature (b) pole of a concave mirror
(ii) State the mirror formula and its magnification.
(iii) Using the same find the distance at which an object to be placed for getting a real, inverted enlarged image at 45 cm using a concave mirror of focal length 20 cm.

- Sol. (i)
(a) The point on the principal axis, about which the spherical surface is generated is called centre of curvature. Any ray passing through this will retrace its path after reflection in the spherical mirror.
(b) The centre of the spherical surface (reflecting) is called pole. Any ray falling at this point coming from one side of the principal axis, will emerge at the same angle on the other side of the principal axis.

(ii) Mirror formula: $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$

Magnification: $m = \frac{-v}{u}$

(iii) $v = 45$ cm, $f = -20$ cm

Using $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$, we get, $\frac{1}{u} = \frac{1}{f} - \frac{1}{v} = \frac{1}{-20} - \frac{1}{45} = -\left[\frac{45+20}{900}\right] = \frac{-65}{900}$

$\Rightarrow u = \frac{-900}{65} = -13.8$ cm

Or

- (i) State the basic laws of refraction
(ii) Describe about refractive index
(iii) Does the incident and emergent ray coincide in a glass slab refraction? Give reason

Sol. **Laws of Refraction:**

- (i) The incident ray, the normal and the refracted ray all lie in a plane.
(ii) The ratio of the 'sine' of the angle of the incidence to the 'sine' of the angle of refraction is a constant, i.e., $\frac{\sin i}{\sin r} = \text{constant}$, for the light of a given colour and for the given pair of media. This law is also known as Snell's law of refraction.

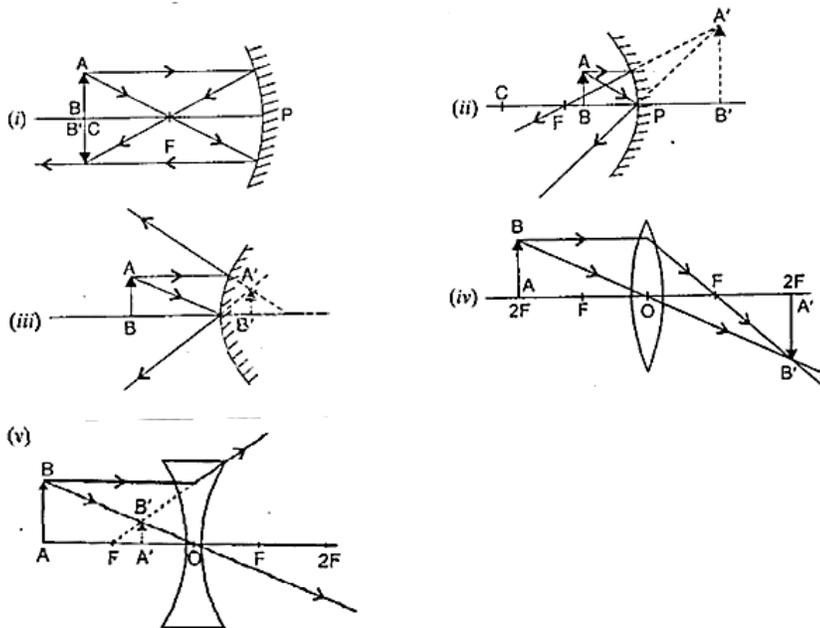
Refractive Index: $\frac{\sin i}{\sin r}$ is called refractive index (μ) of one medium with respect to another

- (iii) No, since the velocity of light in the two media differ the ray of light after refraction bends. This causes a shift laterally. The emergent ray will be parallel to the incident ray and do not coincide.

Q24. 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 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.

Sol.



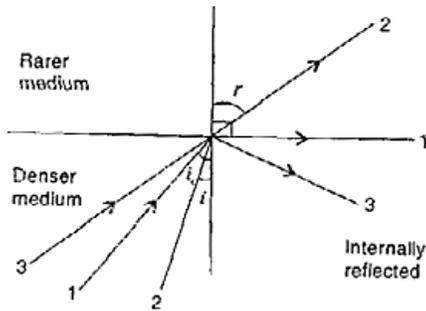
Or

- (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°

Sol. (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 → $i < i_c$ → Refraction
 3 → $i > i_c$ → 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, $i = i_c, r = 90^\circ$

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

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

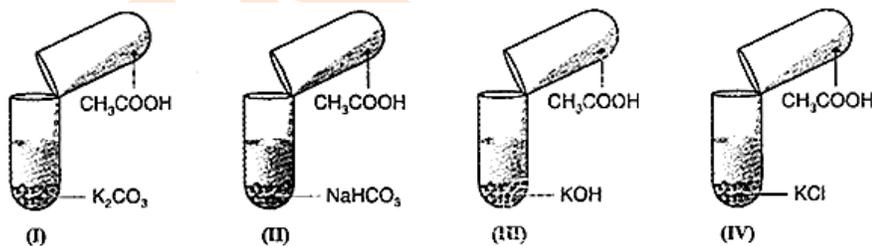
(iv) Given $i_c = 45^\circ$

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

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

SECTION – B

Q25. If burning candle is brought near each of the following test tube:



- (a) In which of the following candle will get extinguished?
 (b) Give the reason for your answer

Sol. (a) I and II candles will get extinguished.
 (b) In, candle I and II gas evolved will be CO_2 which is non – supporter of combustion, therefore candle will get extinguished.

Q26. Watch the diagram given below:



- (a) Which process is being shown here?
- (b) Give reason for your answer.

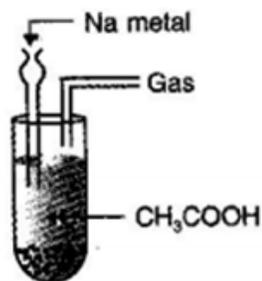
Q27. Who among the following uses a concave mirror and why?

- (a) Automobile rider
- (b) Shopkeeper
- (c) Dentist
- (d) All of these

Sol. (c)

Dentist uses the concave mirror to focus light on the spot required to be seen clearly.

Q28. The gas evolved in the experiment shown here:



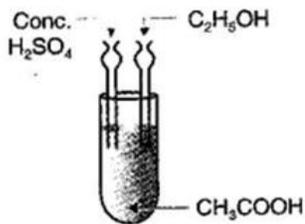
- (a) O₂
- (b) H₂
- (c) CO₂
- (d) Cl₂

Sol. (b)

Q29. When we put acetic in H_2O , the ions formed are

- (i) CH_3COO^-
- (ii) H_3O^+

- (a) Only I
- (b) Only II
- (c) Both I and II
- (d) Neither I nor II



Sol. (c)

Q30. Binary fission occurs in:

- (a) Plasmodium
- (b) Hydra
- (c) Pomegranate
- (d) Paramecium

Sol. (d)

Q31. In which of the following reproduction parental identity is lost

- (a) Budding
- (b) Binary fission
- (c) Multiple fission
- (d) All of above

Sol. (d)

Q32. 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

Sol. (b)

Q33. Chromosomes are made up of:

- (a) Proteins
- (b) DNA
- (c) Both of the above
- (d) RNA

Sol. (c)

Q34. While performing the experiment with glass slab, pins should:

- (a) Be fixed vertically
- (b) Stand in a line
- (c) Not be hammered
- (d) All of these

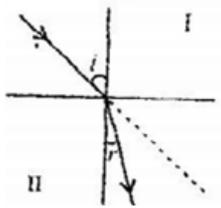
Sol. (a)

Q35. As light gets in from air into glass, light will bend:

- (a) Towards the normal
- (b) Away from the normal
- (c) Parallel to incident surface
- (d) Retrace its path

Sol. (a)

Q36. The II medium shown with refracted ray for the given incident ray is:



- (a) Denser
- (b) Rarer
- (c) May be denser or rarer
- (d) None of these

Sol. (a)