Question 3. Find out, from Table, the medium having highest optical density. Also find the medium with lowest optical density.
Answer:

Material medium	Refractive index	Material medium	Refractive index
Air	1.0003	Canada Balsam	1.53
Ice	1.31	-	-
Water	1.33	Rock salt	1.54
Alcohol	1.36	-	-
Kerosene	1.44	Carbon disulphide	1.63
Fused quartz	1.46	Dense flint glass	1.65
Turpentine oil	1.47	Ruby	1.71
Benzene	1.50	Sapphire	1.77
Crown glass	1.52	Diamond	2.42

Highest optical density = Diamond
Lowest optical density = Air
Optical density of a medium is directly related with the refractive index of that medium. A medium which has the highest refractive index will have the highest optical density and vice-versa.
It can be observed from table 10.3 that diamond and air respectively have the highest and lowest refractive index. Therefore, diamond has the highest optical density and air has the lowest optical density

Question 4. You are given kerosene, turpentine and water. In which of these does the light travel fastest?
Answer:

Material medium	Refractive index	Material medium	Refractive index
Air	1.0003	Canada Balsam	1.53
Ice	1.31	-	-
Water	1.33	Rock salt	1.54
Alcohol	1.36	-	-
Kerosene	1.44	Carbon disulphide	1.63
Fused quartz	1.46	Dense flint glass	1.65
Turpentine oil	1.47	Ruby	1.71
Benzene	1.50	Sapphire	1.77
Crown glass	1.52	Diamond	2.42

The light can travel fast through water.

Question 5. The refractive index of diamond is 2.42. What is the meaning of this statement?
Answer: Refractive index of a medium nm is related to the speed of light in that medium v by the relation:

$$n_m = \frac{\text{Speed of light in air}}{\text{Speed of light in the medium}} = \frac{c}{v}$$

Where, c is the speed of light in vacuum/air
The refractive index of diamond is 2.42. This suggests that the speed of light in diamond will reduce by a factor 2.42 compared to its speed in air.

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Question 1. Define one dioptre of power of a lens?
Answer: One dioptre is the power Of a lens Of focal length 1m.
Power of lens is defined as the reciprocal of its focal length. If P is the power of a lens of focal length F in metres, then
P =1/ f (in meters)
The S.I. unit of power of a lens is Dioptre. It is denoted by D.
1 dioptre is defined as the power of a lens of focal length 1 metre.
1 D = 1 m^{-1}

Question 2. A convex lens forms a real and inverted image of a needle at a distance of 50 cm from it. Where is the needle placed in front of the lens if the image is equal to the size of the object? Also find the power of the lens.
Answer: v = + 50 cm
Since image is real and of same size. The position of image should be double the focal length.
Hence, the object should be at 2f.
V = 2f = 50, f = 25 cm.
Power = 1/f = 100/25 = 4D

Question 3. Find the power of a concave lens of focal length 2 m.
Answer:

f=2 m

$$\text{Power} = \frac{1}{f} = \frac{-1}{2} = -0.5 \text{ D}$$

Power of the concave lens is -0.5 D.

********** END **********