NBSE™
National Board of School Examination

1 2 3
Fill your Question Paper Set Number

Science

Subject: .....

Subject Code: .....

Class: .....

Date of the Examination: .....

Medium of answering the paper: .....

Write Code no. as written on the top of the question paper:	Code Number	Set Number
		1 2 3 4

No. of supplementary answer-book(s) used

Person with Disabilities: **Yes/No**

If physically challenged, tick the category

B D H S C A

B = Visually Impaired, D = Hearing Impaired, H = Physically Challenged, S = Spastic, C = Dyslexic, A = Autistic

Whether writer provided: Yes/No

If visually challenged, name of software used:

Each letter should be written in one box and one box should be left blank between each part of the name. In case Candidate's Name exceeds 24 letters, write first 24 letters.

NATIONAL BOARD OF SCHOOL EXAMINATION

To be filled in by the candidate as per Admit Card

Write and darken the appropriate as applicable

Candidate's Name in CAPITAL Letters

Roll No.

School Code

Subject Code

Subject ..... Class ..... School Code as per admit card .....

Write within this box

Roll No. (in words): ..... **Lakhs** ..... **Thousands** ..... **Hundreds** .....

Father's Name: .....

Signature of Candidate: .....

Space for office use

103649

103649

Signature of Invigilator

Facsimile stamp of the School

Please do not write beyond this line

NATIONAL BOARD OF SCHOOL EXAMINATION

Q.No.	01	02	03	04	05	06	07	08	09	10	TOTAL
MARKS	1	1	1	1	1	1	1	1	1	1	10

Q.No.	11	12	13	14	15	16	17	18	19	20	TOTAL
MARKS	4	4	1	1	3	3	3	3	3	3	28

Q.No.	21	22	23	24	25	26	27	28	29	30	TOTAL
MARKS	3	3	3	3	5	5	5	5	5	5	42

Q.No.	31	32	33	34	35	36	37	38	39	40	TOTAL
MARKS											

Examiner must fill above boxes with question-wise marks obtained by student.

GRAND TOTAL	80
MARKS IN WORDS	Eighty only

Certified that I have evaluated this answer book according to the correct set of question paper and strictly as per the NBSE marking scheme. I also certify that no question has been left un-assessed inside the answer book.

Signature of the Examiner

Certified that marks against each question in the table above have been correctly filled up in accordance with the evaluation done inside the answer book. The marks have also been transferred in the award list/web/app correctly against the roll number of the candidate.

Signature of the Co-ordinator

(To be filled by the student)

Note: Roll No. provided by NBSE to be filled here.

Roll No. | 1 | 0 | 8 | 0 | 0 | 7 | 5 |

Student should write code no. as written on the top of the question paper in the box provided →

No. of supplementary answer-book(s) used (if any)

Section-A

Ans1. (b) Baking soda. (1)

Ans2. (b) Increases. (1)

Ans3. (a) Respiration (1)

Ans4. (a) Pond. (1)

Ans5. (a) 6.5-7.5 (1)

Ans6. (c) Refraction, dispersion, & internal reflection. (1)

Ans7. (a) Nature of material (1)

Ans8. (c) 300. (1)

Ans9. Carbon form strong bonds due to its small size which enables the nucleus of carbon to hold on to the shared pair of e^- strongly, and also covalent bonds formed by carbon are strong bonds. (1)

Ans10. Atomic size increases as we go down across the group in a periodic table due to addition of new shells. (1)

Ans11. (a) Solar energy and Wind energy are renewable source of energy. (1)

(b) Disadvantage of forming dams ⇒ It block the migration of fisheries and also it results in excessive sedimentation at the bottom of the reservoir, this may hamper aquatic life. (1)

(c) AC
(d) It can be transmitted to long distances without much loss of energy. 1

Ans12. (a) Pituitary gland 1
(b) Pancreas 1
(c) Adrenal gland 1
(d) Testes. 1

Ans13. (iv) A is false but R is true.

Ans14. (iv) A is false but R is true.

Section-B

Ans15. (a) Na_2SO_4 + $BaCl_2$ → $BaSO_4\downarrow$ + 2NaCl
(Sodium sulphate) (Barium chloride) (Barium sulphate) (Sodium chloride)
(b) Another name for precipitation reacⁿ is double displacement reacⁿ.
(c) Precipitate formed is Barium sulphate ($BaSO_4$) which is white in colours. ½ ½

Ans16. (a) CO_2 is the gas which is used to extinguishes a burning candle, so,

$CaCO_3$ + dil. H_2SO_4 → $CaSO_4$ + CO_2 + H_2O
(Calcium carbonate) (Calcium sulphate) (Carbon-di-oxide)

Here, X is Calcium carbonate ($CaCO_3$) & gas evolved is Carbon-Di-oxide. ½

(b) The nature of the soil is acidic.
And the farmer treats the soil with quick lime or calcium carbonate which is basic in nature to make the soil neutral which will enhance its fertility. ½

Ans17. Given:- magnification, $m = -2$.
& image is real so, $v = -30\,cm$

(3) Now, Let u be the distance of object from the mirror, so,

$$m = -\frac{v}{u} \Rightarrow -2 = -\frac{(-30)}{u} \Rightarrow u = -\frac{30}{2} \Rightarrow \boxed{u = -15\,cm}$$

So, object is placed at a distance of 15 cm ~~from~~ in front of mirror.

Now, $\frac{1}{f} = \frac{1}{v} + \frac{1}{u} \Rightarrow \frac{1}{f} = \frac{1}{-30} + \frac{1}{-15} \Rightarrow -\frac{1}{30} - \frac{1}{15} \Rightarrow -\frac{1}{15}\left(\frac{1}{2} + 1\right)$

$$\frac{1}{f} = \frac{-1}{+5} \times \frac{3}{2} = \frac{-1}{10}$$

$$\Rightarrow \boxed{f = -10\,cm}$$

And,
If the image is moved to 10 cm towards the mirror, then the new position of the object $= u' = -(15-10) = -5\,cm$.

So, $\frac{1}{f} = \frac{1}{v} + \frac{1}{u} \Rightarrow \frac{1}{-10} = \frac{1}{v} - \frac{1}{5} \Rightarrow \frac{1}{5} - \frac{1}{10} = \frac{1}{v} \Rightarrow \frac{10-5}{50} = \frac{1}{v} \Rightarrow \frac{5}{50} = \frac{1}{v}$

$\Rightarrow \boxed{v = 10\,cm}$

As v is positive so the image will be virtual.

Hence, the new image will be virtual, erect and magnified.

Ans 18 – Element X = Chloride = Element no = 17 = 2, 8, 7.

Element Y = Calcium = Element no = 20 = 2, 8, 8, 2.

(3)

(a) Element X belongs to 17th group & 3rd Period

Element Y belongs to 2nd group & 4th Period. 1

(b) X is non-metal and Y is a metal. 1/2

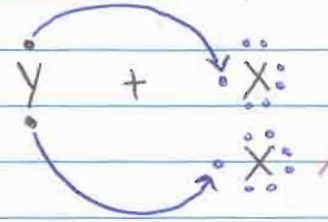
(c) As Y is a metal and metals always combine with oxygen to form basic oxides.

Hence nature of oxide of Y is Basic.

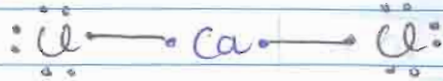
The compound formed will $CaCl_2$. In this metals loose e^-s and non-metals gains e^- which will form positive and negative charged ions. And the bond formed between positive and negative charged ions is ionic bond.

So the bond formed in the compound is ionic bond. 1/2

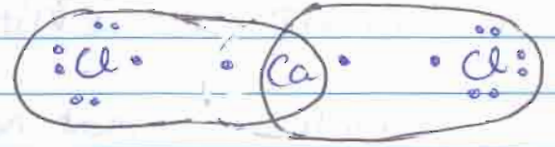
(d) Electron dot structure –



YX_2 ($CaCl_2$)
Calcium chloride.



or



Ans 19 (a) Lymph is another fluid in body apart from blood which is colourless ~~containg~~ containing WBCs that cleans the inside of our body and helps to prevent infections from spreading. It contains less proteins (or no proteins).

(3)

(b) Lymph contains water, solids such as fats, carbohydrates and other waste like urea & calcium, enzymes, inorganic phosphate, chlorides & antibodies are also present but its does not contain any RBC., whereas blood plasma contains RBCs, WBCs & platelets.

(c) Functions of lymphatic system –

(i) Fats from the intestine are absorbed through the lymph.

(ii) supplies nutrition and O_2 to those parts where blood cannot reach and also prevent infection from spreading in body.

Ans 6(a) The endocrine glands of human body relases hormones depending upon needs. and the regulation of quantity and timing of relase of hormone are controlled by feedback mechanism. (3)

Ex- when we eat carbohydrate rich food / diet.

↓

glucose in blood, but if glucose level rises in blood above critical level.

↓

Reuptors on Pancreas senses the high level of glucose.

↓

Pancreas releases insulin in response to high glucose level. (2)

↓

In response to insulin, target cells take up glucose & the liver converts the excess of glucose to glycogen.

↓

Blood glucose level falls to normal.

↓

This signals pancreas to inhibit the release of insulin further.

In this way, the feedback mechanism controls the relase of insulin in body.

(b) Pituitary gland secretes Growth hormone (GH). GH regulates growth and development of the body.

Ans2- Speciation - It is the process by which new species developed from the existing species.

3

Four factors that could lead to speciation are -

(a) Geographical Isolation -
It is caused by various types of barriers like mountain ranges, rivers, etc.

(b) Genetic drift -
It is caused by drastic changes in the frequencies of particular genes by chance only.

(c) Variations -
These can be caused in individual due to natural selection, crossing over, etc.

(d) Mutations -
Drastic changes in the genes or DNA.

Geographical isolation can not be a major factor for the specifaction of a self pollinating plant species as it does not depend on any other plant for its reproduction proces.

Ans22 (a) Electric generator converts the mechanical energy into electrical energy.

(3) Principale —

Electric generator works on the principle of electromagnetic induction which is, if we keep on moving or changing the magnetic field around a conductor, current gets induced in it.

(b) Earth wire helps in preventing electric shocks and preventing electrical appliances from getting burst off when large amount of current flows through them.
In earthing one end of the appliance is connected to a copper wire while the other end is connected to earth wire which directs excess of current in the earth's crust. When excess current flows through the appliance, then that current is transported inside ~~and~~ earth through earth wire to protect the appliances.

Ans23- A pencil when dipped in water in a glass tumbler appears to be bent at the interface of air and water because of refraction of light.

(3) Refraction of light is meant by the change in the direction of propagation of light when it travels from an optically denser medium to an optically rarer medium or vice versa.
No, the pencil will not appear to be bent to the same extent, if instead of water, we use liquids like kerosene or turpentine because their optical density is different of that of water and the refraction of light depends on the optical density of different medium.

Ans24- Ozone is the outermost layer of atmosphere which is the a molecular form of oxygen (O_3).

(3) → Ozone is formed in stratosphere.

when UV rays falls on oxygen molecule then oxygen splits into free oxygen atom.

$$O_2 \xrightarrow{\text{U.V rays}} O + O.$$

when these free oxygen atoms combine with any other molecule of oxygen, then ozone is formed.

$$O + O_2 \longrightarrow O_3.$$

→ Ozone shields the surface of earth from UV radiations from the sun which are highly damaging to organisms and can cause skin cancer.

Section-C

Ans25- (5)

A is CH_3COOH (ethanoic acid)

B is CH_3COONa (sodium ethanoate).

C is C_2H_5OH (ethanol)

D is an ester $CH_3COOC_2H_5$ (ethyl ethanoate).

Reacⁿ involved -

$$A + Na \longrightarrow B + H_2$$

$$CH_3COOH + Na \longrightarrow CH_3COONa + H_2$$

(Acetic acid) (sodium ethanoate)

$A + C \xrightarrow{\text{Acid}} D$

$CH_3COOH + C_2H_5OH \xrightarrow{\text{Acid}} CH_3COOC_2H_5 + H_2O$

$D + NaOH \longrightarrow B + C$

$CH_3COOC_2H_5 + NaOH \longrightarrow CH_3COONa + C_2H_5OH$.

(b) We can use litmus paper to identify tube containing ethanol, ethanoic acid and soap soln. Ethanoic acid turns blue litmus to red, soap soln turns red litmus to blue and ethanol does not change the colour of the litmus paper - Now, we can identify each test tube by dipping litmus paper in it.
It would be ~~different~~ difficult to identify ethanol and ethanoic acid by using Na metal since both the compounds give out Hydrogen gas. 2
When they react with sodium —

$CH_3COOH + Na \longrightarrow CH_3COONa + H_2$.

$C_2H_5OH + Na \longrightarrow C_2H_5ONa + H_2$

But soap doesn't react with sodium.

(c) Hard water contains calcium and magnesium salts and soap is long carbon chain of Na or K salts. When soap is added to hard water, the long carbon chains react with calcium or magnesium salts to form an insoluble substance known as scum. 1

Ans26 – X = 12 Atomic no. = Magnesium , E·C = 2, 8, 2.
Y = 17 Atomic no. = chlorine , E·C = 2, 8, 7.

5

Electron dot structure of X = $X^{\times}_{\times}$ or $Mg^{\times}_{\times}$

Electron dot structure of Y = $\cdot\ddot{Y}:$ $\cdot\ddot{Cl}:$

$$:\ddot{Y}: \curvearrowleft \times X \times \curvearrowright \cdot\ddot{Y}: = [X^+][:\ddot{Y}:^-]_2$$

When we put X as Mg and Y as Cl.

$$Mg \longrightarrow Mg^+ + 2e^-$$
2, 8, 2 — 2, 8.

$$Cl + e^- \longrightarrow Cl^-$$
2, 8, 7 — 2, 8, 8.

And, $:\ddot{Cl}\cdot \curvearrowleft \times Mg \times \curvearrowright \cdot\ddot{Cl}: = MgCl_2$.

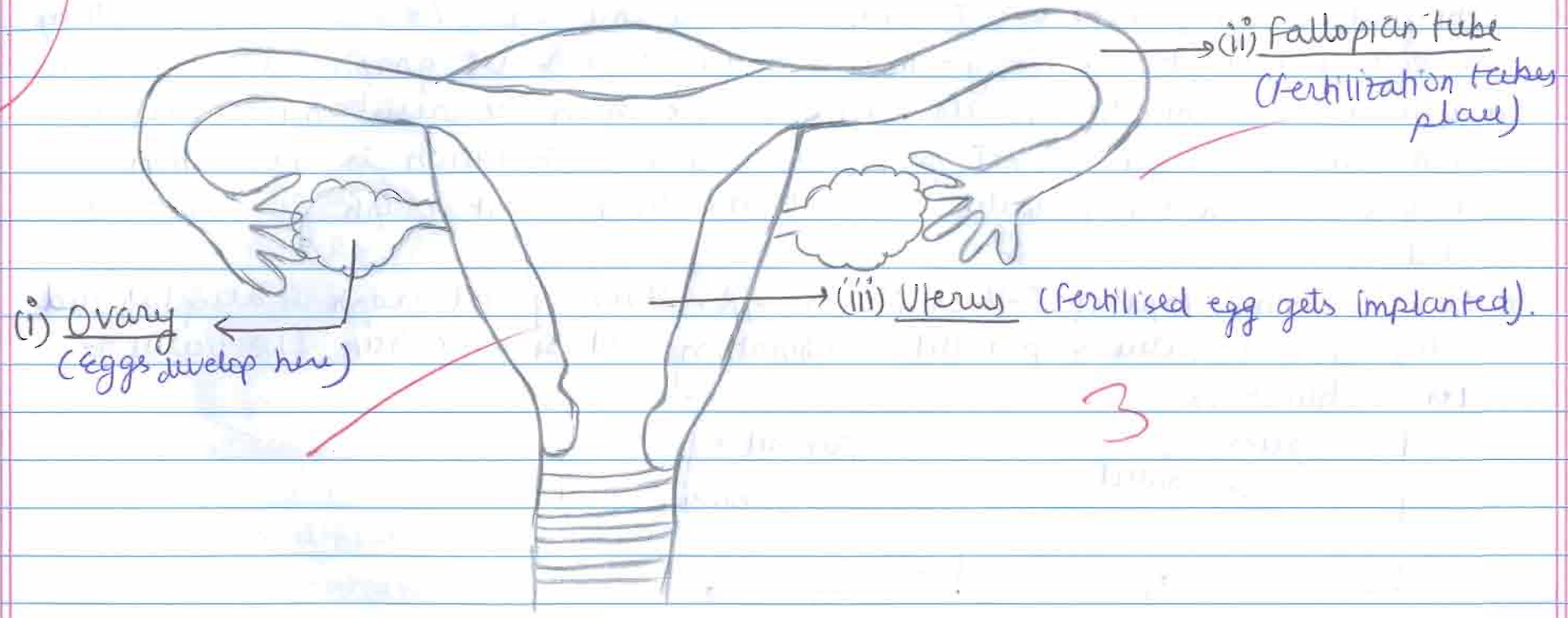
$XY_2 = MgCl_2$ and hence bond is formed b/w ions so the bond is electrovalent bond or ionic bond.

(b) Thermite reac^n occurs when oxide of iron reacts with Aluminium, displacement reac^n occurs which liberates so much heat the iron is produce in its molten state.

Eq^n – $2Fe_2O_3(s) + Al(s) \longrightarrow 2Al_2O_3(s) + 2Fe$ (molten).

(Used to fill cracks in railway joints)

Ans 27 — 5



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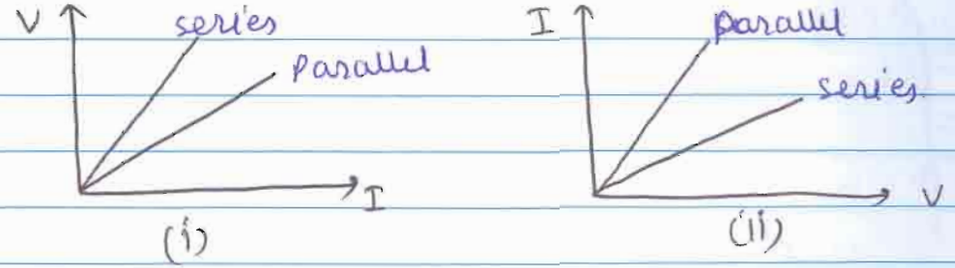
(b)(i) In order to receive the zygote the uterus forms a thick layer of blood cells and muscle called endometrium layer or its inner linning to nourish the zygote. 1

(ii) If the zygote is not found then the endometrium layer sheds and flows out of the female body through vagina. It is also known as menstruation. 1

Ans28- (a) Both the diagrams are correct representation of series & parallel grouping.

5 → In the first graph, slope of V-I graph is resistance as $V = IR$, which satisfy the eqn of straight line, i.e, $y = mx$, hence slope of V-I graph gives resistance. Since, in series combination, resistance is more than the resistance in parallel combination, ∴ slope of V-I graph for series combination is more than the slope of V-I graph for parallel combination. Hence, first graph is correctly labelled.

In the 2nd graph, slope of I-V graph is $1/R$. Hence second graph is also labelled correctly as $1/R$ value of parallel combination will be more than $1/R$ value of series combination. 2



(b) Alloys are used in electrical heating devices rather than pure metals because the resistivity of an alloy is more than the resistivity of a pure metal. Moreover, alloy does not burn (or oxidize) easily even at higher temperature. 1

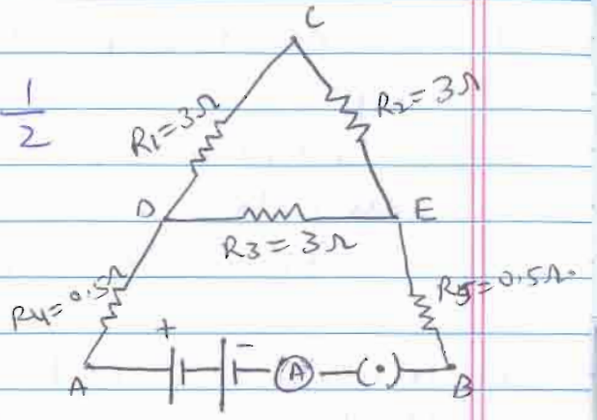
(c) R_1 and R_2 are in series.

so, $R' = R_1 + R_2 = 3 + 3 = 6\,\Omega$.

Now, R' and R_3 are in $||^{el}$ combination.

$$\frac{1}{R''} = \frac{1}{R'} + \frac{1}{R_3} = \frac{1}{6} + \frac{1}{3} = \frac{1}{3}\left(\frac{1}{2}+1\right) = \frac{1}{3}\left(\frac{3}{2}\right) = \frac{1}{2}$$

$$\boxed{R'' = 2\Omega}$$



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Now,

R'', R_4 & R_5 in series combination.

$R_{eq} = R'' + R_4 + R_5 = 2 + 0.5 + 0.5 = 3\Omega$.

Hence equivalent resistance when circuit is closed is 3Ω.

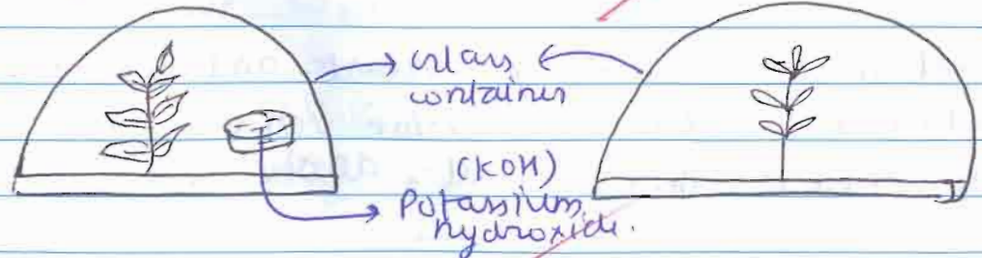
$$\boxed{\text{Ans} = 3\Omega}$$

Ans29- Activity to show that carbon-di-oxide is necessary for photosynthesis.

5

(i) Take two potted plants in two separate glass containers.

(ii) Cover the glass containers with vaseline to prevent movement of gases inside.



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(iii) In one of the containers, put KOH, inside to absorb CO_2 and rest conditions remains same.

(iv) So, one container has CO_2 and other does not due to presence of KOH.

(v) In the container with the absence of CO_2, the plant did not survived for long.

(vi) In the container, with the presence of CO_2 the plant still survived. This tells that CO_2 is nessary for photosynthesis as due to photosynthesis glucose will form which helps plants to survive.

(b) Circulation of blood in human beings is known as double circulation because the blood is transported twice through the heart.

- Pulmonary circulation – when blood moves from heart to lungs and back again from lungs to heart is called pulmonary circulation. Blood moves from heart to lungs for purification. Deoxygenated blood carried from heart by pulmonary artery to lungs for purification. Then, pulmonary vein ~~having~~ brings back oxygenated blood from lungs to heart.

2

- Systemic circulation – when blood moves from body to heart and then back again to body is called systemic circulation. Inferior & superior vena cava carries deoxygenated blood from body to heart. Then after all, aorta again circulates the purified blood to the body.

Hence, the double intake and double outward movement is called double circulation of blood.

Ans 5(a) The power of lens is regarded as its ability to converge or diverge light rays.
The formula of power is $P = \frac{1}{f}$ where f (focal length) is taken in metres (m).
It's unit is Dioptre (D).
Convex lens have positive power where concave lens have negative power.

(i) Power of $L_1 = +10D$.

$$P = \frac{1}{f} \Rightarrow 10 = \frac{1}{f} \Rightarrow f = 0.1m \Rightarrow \boxed{f = 10cm}$$

Hence, f = positive so, it is convex lens (converging lens).

(ii) Power of $L_2 = 5D$.

$$P = \frac{1}{f} \Rightarrow 5 = \frac{1}{f} \Rightarrow f = \frac{1}{5} = 0.2m \Rightarrow \boxed{f = 20cm}$$

Hence, f = positive so, it is convex lens (converging lens).

(iii) Power of $L_3 = -10D$.

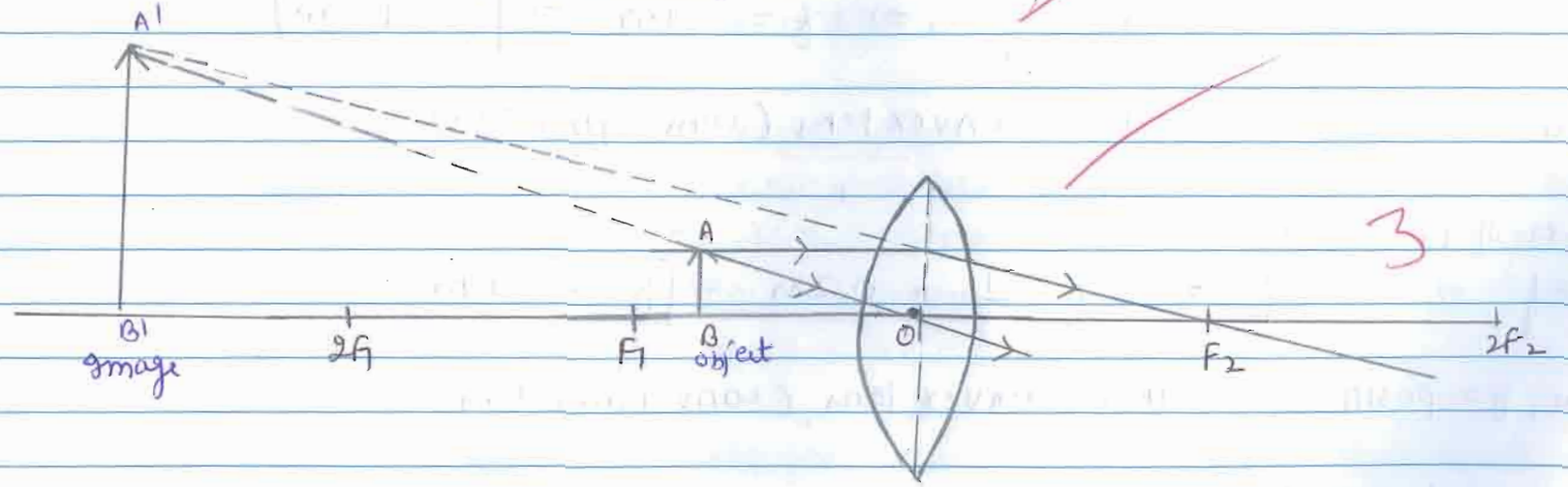
$$P = \frac{1}{f} \Rightarrow -10 = \frac{1}{f} \Rightarrow f = \frac{-1}{10} = -0.1m \Rightarrow \boxed{f = -10cm}$$

Hence, f = negative so, it is concave lens (diverging lens.)

→ L_2 will produce virtual, erect and enlarged or magnified image because the distance of the object is less than focal length or the object lies between the optical centre and Principal focus.

→ L_1 will not produce a virtual erect and enlarged image because the object lies between F_1 and $2F_1$.

→ L_3 being diverging in nature, i.e, a concave lens it always produces a virtual, erect and diminished image of the object.



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(b) Since $\mu_{air} = 1$, $\mu_{glass} = 1.5$.

Refractive index of diamond w.r.t glass $= \frac{\mu_{diamond}}{\mu_{glass}} = 1.6$.

$\mu_{diamond} = 1.6 \times 1.5 = 2.4$.

So,

Absolute Refractive index of diamond $= \frac{\mu_{diamond}}{\mu_{air}} = \frac{2.4}{1} = 2.4$. 2

Hence, Refractive index of diamond is 2.4.