ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව

இலங்கைப் பரீட்சைத் திணைக்களம்

රහසායි

අ.පො.ස. (සා.පෙළ) විභාගය - 2021(2022)

க.பொ.த. (சா.தர)ப் பரீட்சை - 2021(2022)

විෂය අංකය பாட இலக்கம்	34	විෂයය பாடம்	Science

I පත්‍රය - පිළිතුරු

I பத்திரம் - விடைகள்

ප්‍රශ්න අංකය வினா இல.	පිළිතුරේහි අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරේහි අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරේහි අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරේහි අංකය விடை இல.
01.	3	11.	3	21.	4	31.	2
02.	2	12.	1	22.	4	32.	1
03.	4	13.	2	23.	2	33.	2
04.	4	14.	3	24.	1	34.	2
05.	3	15.	2	25.	1	35.	4
06.	3	16.	1	26.	2	36.	1
07.	4	17.	3	27.	1	37.	3
08.	1	18.	1	28.	4	38.	1
09.	2	19.	2	29.	1 / 2	39.	2
10.	4	20.	3	30.	4	40.	4

විශේෂ උපදෙස්   එක් පිළිතුරකට ලකුණු   **01**   බැගින්

විசேட அறிவுறுத்தல்   ஒரு சரியான விடைக்கு   புள்ளி வீதம்

මුළු ලකුණු / மொத்தப் புள்ளிகள்   **01 × 40 = 40**

පහත නිදසුනෙහි දක්වෙන පරිදි බහුවරණ උත්තරපත්‍රයේ අවසාන තීරුවේ ලකුණු ඇතුළත් කරන්න.

கீழ் குறிப்பிடப்பட்டிருக்கும் உதாரணத்திற்கு அமைய பல்தேர்வு வினாக்களுக்குரிய புள்ளிகளை பல்தேர்வு வினாப்பத்திரத்தின் இறுதியில் பதிக.

නිවැරදි පිළිතුරු සංඛ්‍යාව சரியான விடைகளின் தொகை	25	I පත්‍රයේ මුළු ලකුණු பத்திரம் I இன் மொத்தப்புள்ளி	25
	40		40

සියලු ම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது /All Rights Reserved]

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව **ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව**
இலங்கை பரீட்சைத் திணைக்களம் இலங்கை பரீட்சை **இலங்கை பரீட்சைத் திணைக்களம்**
Department of Examinations, Sri Lanka Department of **இலங்கை பரீட்சைத் திணைக்களம்**
ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභ
இலங்கை பரீட்சைத் திணைக்களம் இலங்கை பரீட்சை **Department of Examinations, Sri Lanka**

| 34 | E | II |

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2021(2022)
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தரப் பரீட்சை, 2021(2022)
General Certificate of Education (Ord. Level) Examination, 2021(2022)

විද්‍යාව	II	පැය තුනයි
விஞ்ஞானம்	II	மூன்று மணித்தியாலம்
Science	**II**	**Three hours**

අමතර කියවීම් කාලය   - මිනිත්තු 10 යි
மேலதிக வாசிப்பு நேரம் - 10 நிமிடங்கள்
Additional Reading Time- 10 minutes

Use additional reading time to go through the question paper, select the questions you will answer and decide which of them you will prioritise.

Index Number: ....

Instructions:
* Write your answers in neat handwriting.
* Answer the **four** questions in **Part A**, in the space provided.
* Of the **five** questions in **Part B** answer **three** questions only.
* After answering, tie Part A and the answer script of Part B together and hand over.

Part A

1. (A) The following diagram briefly indicates the ways by which air, soil and water are polluted.
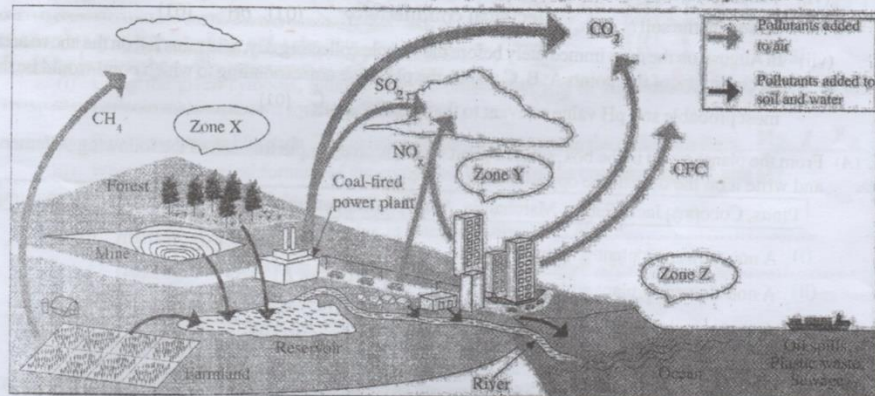

Fill in the blanks in the table selecting **an example** from the diagram relevant to each of the following statements.

	Statement	Example
(i)	The gas contributing most to the increase in global warming	CO_2/ Carbon dioxide (01)
(ii)	The main source that releases the components causing eutrophication in the reservoir	Farmland (01)
(iii)	Gaseous organic compound that depletes the ozone layer	CFC / chlorofluorocarbon (01)
(iv)	The zone most prone to have photochemical smog	Zone Y (01)
(v)	The source producing gases which cause acid rains	Coal – fired power plant/ Coal/ Vehicles/Ships /Factories (01)
(vi)	The source that adds ground heavy metals to topsoil	Mine (01)
(vii)	The pollutant accumulated in living organisms through food chains and subjected to the minimum chemical digestion in the digestive system	Plastic (waste) (01)

07

(B) In a certain area, a study was conducted about soil pollution. In this study, soil samples were collected monthly from a selected site and their physical properties density, moisture content, electrical conductivity and pH value were determined and plotted.
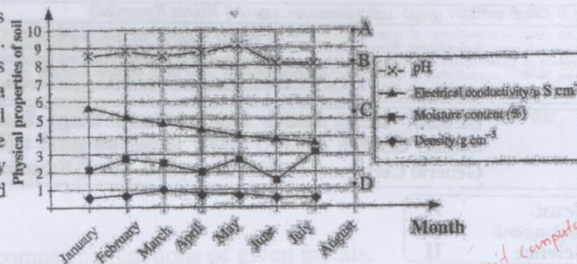
Answer the following questions based on the above graphs.

(i) According to the density graph, what was the maximum density value reported? 1 g cm^{-3} (01)

(ii) In which month was the moisture content at a minimum value? ...... June ... (01)

(iii) How much is the amount of moisture contained in 100 g of the soil sample collected in April? .... 2 g / 2 / 2% (01)

(iv) In which time range had the soil pH stayed constant? .... From June to July / June - July (01)

(v) Which physical property shows a continuous decrease during the period of data collection? .... Electrical conductivity ..... (01)

(vi) Which physical properties shown in the graph are determined by the amount of ionic components present in the soil? .... Electrical conductivity ... (01), pH ... (01) ....

(vii) In August, on the days immediately before the sample collecting day, acid rains fell on the above area. Accordingly, of the points A, B, C and D, the pH value corresponding to which point would be the most probable soil pH value relevant to that month? ...... C .. (01) ....

08

15
15

2. (A) From the plants given in the box, select a plant which is an example for each of the following statements and write it on the dotted line opposite each.

Pinus, Coconut, Jack, Paddy, Marchantia, Acalypa (kuppamania/kuppameni), Cycas, Pogonatum

(i) A non-flowering plant without seeds   Marchantia / Pogonatum (01) ......

(ii) A non-flowering plant with seeds   Cycas / Pinus   (01) ....

(iii) A monocotyledonous flowering plant   Coconut / Paddy (01) ....

(iv) A dicotyledonous flowering plant   Jack / Acalypa / Kuppamania (01)

04

(B) In order to demonstrate the action of the enzyme amylase on starch during the process of digestion of food, a mixture was made by adding starch and amylase to water. The mixture was placed in a water bath at a temperature 37 °C. After five minutes, a drop from the mixture was taken out, a drop of iodine solution was added to it and the colour was observed. The above test was repeated at times given in the following table. The colour observed in each instance is shown in the table.

Time/minutes	5	15	25	35	45
Colour observed	Violet-blue	Blue	Blue	Yellow-brown	Yellow-brown

(i) What is the compound formed by the action of amylase on starch in the aqueous medium? .... Maltose ... (01)

(ii) Give the reason for the following observations.   (01)
   (a) Appearance of blue colour after 15 minutes ...Presence of starch ....
   (b) Appearance of yellow-brown colour after 35 minutes . All starch are reacted (01) ...

(iii) Why is the mixture subjected to the experiment kept in a water bath at 37 °C? . Providing the optimal temperature for enzymatic action /Maintaining at the body temperature / To increase the rate of the reaction (01)

(iv) Which component does not undergo a chemical change though contributes to the chemical reaction pertaining to the above experiment? .... Amylase / Enzyme ...... (01)

05

(C) Given below is a diagram of a typical plant cell drawn based on the electron microscopic observations.

(i) By which letter is the structure that helps to maintain the shape of plant cells named?

P .... (01)

(ii) Write the names of the organelles labelled Q and T in the relevant boxes.

(iii) By what letter is the organelle that can also be identified when observed under the optical microscope labelled?

R / S .... (01)

P
Chloroplast
R
Mitochondrion
S
Q | Plasma membrane / Cell membrane | (01)
T | Golgi complex/Golgi body/Golgi apparatus | (01)

(iv) State the function carried out by the following organelles.

(a) chloroplast   Carry out photosynthesis / Production of food   (01)

(b) mitochondrion   Cellular respiration / Aerobic respiration / Production of energy   (01)

06   **15/15**
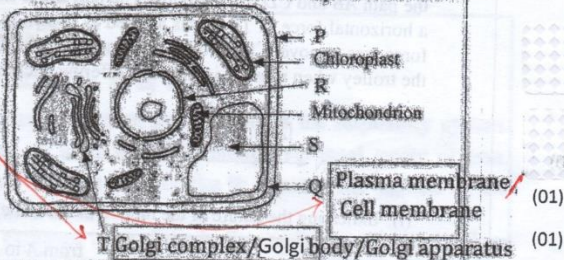
3. *(A)* How electrons exist in the energy levels belonging to atoms of elements L, M, Q and R are illustrated in the following diagrams. L, M, Q and R are not the standard symbols of those elements. Given on the right hand side is a periodic table indicating the places of the first twenty elements.

L   M   Q   R   (03)
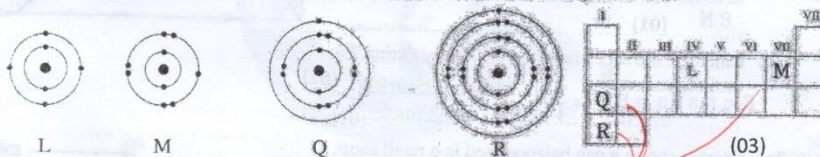
(i) Using the given symbols, indicate the positions belonging to the elements M, Q and R in the periodic table as shown for element L.

(ii) Write the chemical formula of M existing in the gaseous state in the molecular form. M_2 / F_2 (01)

(iii) What is the chemical formula of the compound formed by the combination of L and M?
LM_4 / CF_4 (01)

(iv) Of L and M, which element is higher in electronegativity? M / F   (01)

(v) Of Q and R, which element is lower in first ionisation energy? R / K   (01)

(vi) State the acidic/basic nature of the following oxides formed by L and Q.

LO_2 : acidic   (01) Q_2O : basic   (01)

(vii) The diagram illustrates how Q exists in the ionic compound formed by the combination of Q and M. Draw how M exists in that compound.   (01)

(01)

11
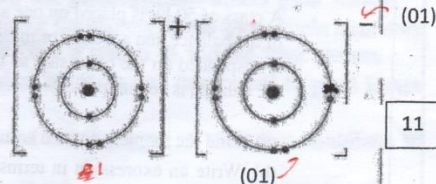
(B) Chemical bonds within the water molecules and among the water molecules are indicated in the diagram by the arrows ① and ② respectively. Using it fill in the blanks in the following sentences.

(i) The bond type indicated by the arrow ① is known as covalent bond and the bond type
indicated by the arrow ② is known as inter molecular bond / inter molecular attraction
Hydrogen bond / inter - molecular forces   (01)

(ii) The type of bonds indicated by the arrow 2 (01) is responsible for the existence of relatively higher boiling point of water.

(iii) A very small positive / + / δ⁺ (01) charge lies on the hydrogen atoms in the water molecules.

04   **15/15**

[See page four
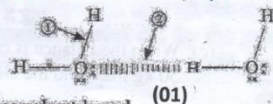
4. (A) *ABCD* is a horizontal path. The distances between the points *AB*, *BC* and *CD* are equal. The parts of the path *AB* and *CD* offer friction. The part *BC* is smooth. A trolley of mass 4 kg was placed at *A* and a horizontal force of 12 N was applied as shown in the figure. When the trolley reached *B*, the 12 N force was removed. The trolley that entered part *CD* came to rest at *D*. The frictional force acting on the trolley when moving in the parts offering friction was 4 N.

```
        12 N
      ┌─────┐
      │4 kg │
  4 N ◄─○─○──────────●───────────●──────────●
        A            B           C          D
```

(i) Indicating the nature of the motion of the trolley from *A* to *D*, complete the following table.

	from *A* to *B*	from *B* to *C*	from *C* to *D*
Nature of motion of the trolley	acceleration	uniform velocity	deceleration/retardation/negative acceleration
	(01)	**(01)**	**(01)**

(ii) On the following system of axes, draw the approximate velocity-time graph for the motion of the trolley from *A* to *D*.
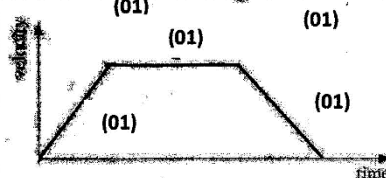
(iii) What is the unbalanced force acting on the trolley in its motion from *A* to *B*?
   8 N **(01)**

(iv) Calculate the acceleration of the trolley during its motion from *A* to *B*.
$F = ma / a = \dfrac{F}{m}$ $= \dfrac{8\,N}{4\,kg}$ Any subsitution **(01)** $a = 2\,ms^{-2}$ **(01)**

(B) The diagram shows a pan balance used in a retail shop.

(i) When 1 kg of sugar is placed on one pan of the balance, what is the mass of the weight that should be placed on the other pan to counterpoise the balance?
   1 kg **(01)**

(ii) What is the force acting on the string by which the balance is suspended when it is counterpoised as mentioned in (i) above? The mass of the balance only is 3 kg. ($g = 10\ ms^{-2}$)
   50 N **(01)**

(iii) The figure shows a floor balance used in a wholesale store to weigh a large mass. A mass of 50 kg is placed on one side of the balance and a weight of mass *m* is suspended on the other side so that the balance is counterpoised.
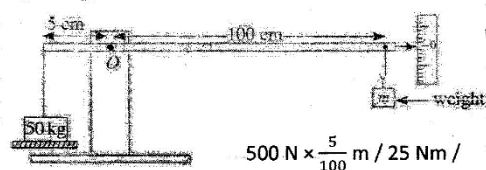
(a) Find the moment created around point *O* by the mass of 50 kg.
   $500\,N \times \dfrac{5}{100}\,m$ / 25 Nm / 500 N × 5 cm / 2500 Ncm **(01)**

(b) Write an expression in terms of *m* for the moment created around point *O* by the weight.
   $mg \times 1\,m$ / $mg \times 100\,cm$ / 10*m* **(01)**

(c) When the balance is counterpoised around point *O*, the anticlockwise moment created by the 50 kg mass and the clockwise moment created by the weight are equal. Find the value of *m*.
   m = 2.5 kg **(01)**

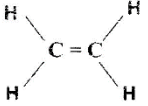(d) State **two** advantages of using a floor balance instead of a pan balance for measuring a large mass.
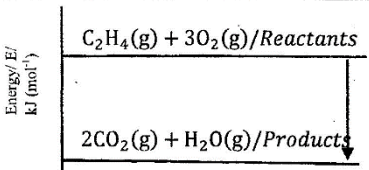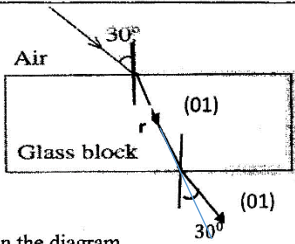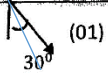I. Easy to handle the weight. / **Can measure a large mass**
II. No need of large standard weight to weigh / no need to lift the balance
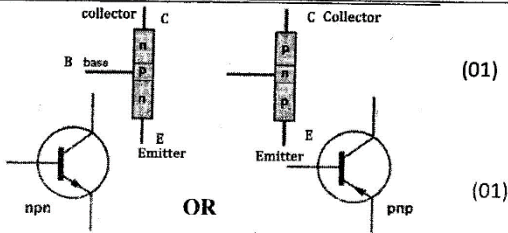   **Any two answers (02)**
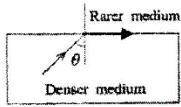
08
07
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15

[See page five

5	(A)	(i)		• Moisturizing **or** humidifying inhaled air • Bringing inhaled air to the body temperature • Removal of impurities or foreign bodies from inhaled air For any **two**	2
		(ii)		• Diaphragm (01) • Ribs / Give marks even for inter - costal muscles. (01)	2
		(iii)	(a)	• **X -** O_2 / Oxygen (01) • **Y -** CO_2 / Carbondioxide Give marks even for H_2O **or** water vapour (01)	2
			(b)	Diffusion	1
			(c)	A - oxygen concentration is low B - oxygen concentration is high A - deoxygenated blood B - oxygenated blood A - CO_2/HCO_3^- concentration is high B - CO_2/HCO_3^- concentration is low For any **one**	1
			(d)	• Alveolar walls being thin • Alveolar walls being wet • Alveolar walls being permeable • Presence of a blood capillary network around alveoli • Presence of a large number of air sacs For any **one**	1
			(e)	Silicosis	1
					10
	(B)	(i)		Light energy → Chemical energy	1
		(ii)		Diffuses (01) into leaves through stomata (01)	2
		(iii)		Yes (01) Because without water the plant will die / Cannot set up a control experiment without water (01)	2
		(iv)	(a)	• Xylem vessels (01) • Tracheid (01)	2
			(b)	Minerals	1
			(c)	Providing mechanical strength / support/ rigidity to the plant	1
			(d)	Lignification (of cell wall) **or** (Cell walls) are lignified.	1
				TOTAL MARKS	20

6.	(A)	(i)		Compounds that increase the OH^- ion concentration (in an aqueous solution) **or** compounds that release OH^- ions (to an aqueous solution)	1
		(ii)		Because NaOH completely dissociates/ionizes (in an aqueous solution) **or** $NaOH(aq) \rightarrow Na^+(aq) + OH^-(aq)$ Physical status **are not** essential.	1
		(iii)		In the production of soap/ paper/ artificial silk/ dyes/ medicine **or** refining petroleum products For any **one**	1
		(iv)	(a)	• Volumetric flask • Watch glass • Funnel For any **two**	2
			(b)	Molar mass of NaOH $\quad = 23 + 16 + 1$ $\qquad\qquad\qquad\qquad = 40\ (g\ mol^{-1})$ (01) Number of moles of NaOH $= \dfrac{1}{1000} \times 500$ / $\dfrac{40}{1000} \times 500$ $\qquad\qquad\qquad\qquad = 0.5\ mol$ (01) Mass of NaOH $\qquad\quad = 0.5 \times 40$ $\qquad\qquad\qquad\qquad = 20\ g$ (01)	3
			(c)	• Weighing NaOH less than the amount required • Not transferring all NaOH to the flask • Overlooking errors in the balance • Not weighing accurately • Addition of water in excess • Not using distilled water For any **two**	2
					10
	B	(i)	(a)	Fractional distillation	1
			(b)	• Wax (paraffin) • Bitumen / Tar / Asphalt • Grease For any **one**	1
		(ii)		$CH_2 = CH_2$ For this $CH_2 = CH_2$ (01) only	2
		(iii)		Polythene/ polyethylene/ polyethene	1
		(iv)		• Absence of double bond in ethane • Presence of only single bonds in ethane • Ethane is an alkane. • Presence of a double bond in ethene • Ethene is an alkene For any **one**	1
		(v)	(a)	$x = 2$ **or** $C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(l) + (Heat)$	1
			(b)	Energy/ E/ $kJ\ (mol^{-1})$ $C_2H_4(g) + 3O_2(g)$/Reactants Showing reactants and products (01) Labelling the axis (01) $2CO_2(g) + H_2O(g)$/Products For the downward arrow (01)	3
					10
				TOTAL MARKS	**20**

7	(A)	(i)				2
		(ii)		 Showing 'r' in the diagram		1
		(iii)		$n = \dfrac{\sin i}{\sin r}$ **or** $n = \dfrac{\sin 30^0}{\sin r}$ **or** $\sin r = \sin 30^0 / n$ **or** $\sin r = \dfrac{1}{2\,n}$ **or** $n = \dfrac{\sin \text{ value of angle of incidence}}{\sin \text{ value of angle of refraction}}$		2
		(iv)		30^0 **or** showing 30^0 in the diagram		1
		(v)	(a)	**or** travels along the interface		1
			(b)	Total internal reflection		1
			(c)	• Optic fibers • Internet connections • Periscope • Endoscope • Telephone communication technology • Decorations • Binocular For any **two**		2
						10
	(B)	(i)		$Q = m\,c\,\theta$ For the equation (01) $= 1\,(kg) \times 4200\,(J\,kg^{-1}\,{}^0C^{-1}) \times 80\,({}^0C)$ For the substitution (01) $= 336\,000\,J$ OR $= 336\,kJ$ Answer with unit (01)		3
		(ii)		$Q = C\,\theta$ **or** $= 160\,(J\,{}^0C^{-1}) \times 80\,({}^0C)$ (01) $= 12\,800\,J$ **or** $12.8\,kJ$ (01)		2
		(iii)		$E = P\,t$ **or** $t = E / P$ **or** For Calculating total energy (01) mark $t = \dfrac{(336\,000 + 12\,800)\ or\ 348\,800}{1000}$ For the equation or substitution (01) $t = 348.8$ seconds **or** 5.81 minutes For the answer with unit (01)		3
		(iv)	(a)	Convection		1
			(b)	Radiation		1
						10
				TOTAL MARKS		**20**

8.	(A)	(i)		Depositing the pollen of a flower artificially on the stigma of the same flower or on the stigma of a different flower of the same species with fingers or with a brush. **Free mark** ✕	1
		(ii)		Survival in unfavourable time/ Perennation/ Dormant period / Dormancy	2
		(iii)		Tissue culture	2
		(iv)		• Having a strong root system • Being resistant to diseases and pests • Withstanding unfavourable environmental conditions • Having uniform growth • Both woodapple and orange are plants showing affinities For any **two**	2
		(v)		Any letter can be used (instead of R (r)) Gametes 		R	r	For showing ~~genotypes~~ (01) |---|---|---| 	R	RR	Rr | 	r	Rr	rr	(01) (for the punnet square) Indicating the ratio between round seeds and wrinkled seeds as 3 : 1 (01) Deduct 1 mark for any other explanation without the Punnett square.	3
					10
	(B)	(i)		Fleming's right-hand rule	2
		(ii)		Q to P	1
		(iii)	(a)	Y	1
			(b)	Because LED / W is reverse biased Give **only 1 mark** for stating LED/W dose not allow the current to flow	2
		(iv)	(a)	(PQ conductor rod) moves towards the right. For stating that 'PQ moves' give **only 1 mark**	2
			(b)	(DC) motor **or** speaker (loudspeaker)/Galvanometer/Ammeter/Voltmeter	2
					10
				TOTAL MARKS	**20**

9	(A)	(i)		X, Y, Cu **or** X >Y> Cu	1
		(ii)		In between Y and Cu	1
		(iii)	(a)	X	1
			(b)	Cu	1
		(iv)		M$\cancel{g}$ Y + 2HCl → YCl$_2$ + H$_2$ For correct reactants and products (01) For the balanced equation (01) If Mg is used instead of Y marks will be awarded.	2
		(v)	(a)	Cu^{2+} (aq) + 2e → Cu(s) Award marks even without physical states	1
			(b)	(Intensity of) blue color decreases / becomes colorless	1
		(vi)	(a)	Zn / Zinc plate	1
			(b)	SO$_4^{2-}$ / Sulphate ion	1
					10
	(B)	(i)		A – Microphone (01) B – Amplifier (01) C – Loudspeaker / speaker (01)	3
		(ii)		Sound waves vibrate the diaphragm and induce an electromotive force / a current.	1
		(iii)		 It is compulsory to label terminals either in the structure or the symbol.	2
		(iv)		• Coil • Magnet • Paper/ cardboard cone / Diaphragm For any **two**	2
		(v)		Loudness	1
		(vi)		Pitch / Loudness / Quality of sound	1
					10
					20

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