

OL/2018/34/E-I

සියලු ම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது (All Rights Reserved)

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
 இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம்
 Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka
 ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
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34 E I

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2018 දෙසැම්බර්
 கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2018 டிசம்பர்
 General Certificate of Education (Ord. Level) Examination, December 2018

08.12.2018 / 1300 - 1400

විද්‍යාව I
 விஞ்ஞானம் I
 Science I

පැය එකයි
 ஒரு மணித்தியாலம்
 One hour

Note :

- * Answer all questions.
- * In each of the questions 1 to 40, pick one of the alternatives (1), (2), (3), (4) which you consider is correct or most appropriate.
- * Mark a cross (X) on the number corresponding to your choice in the answer sheet provided.
- * Further instructions are given on the back of the answer sheet. Follow them carefully.

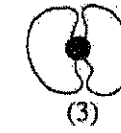
1. Which of the following is an example for a plant which does not produce seeds?
 (1) Cycas (2) Pinus (3) Salvinia (4) Blue water lily
2. The SI unit of force in fundamental units is,
 (1) kg m s⁻². (2) kg m s⁻¹. (3) kg m² s⁻¹. (4) kg m⁻² s⁻².
3. Which of the following is a homogeneous mixture?
 (1) wheat flour + water (2) ethyl alcohol + water
 (3) coconut oil + water (4) clay + water
4. Of the following statements, which is false about a silicon npn junction transistor?
 (1) It can be used to amplify signals. (2) It can be used as a switch.
 (3) It can be used as a current amplifier. (4) It can be used to rectify alternating voltages.
5. If an object is to stay in equilibrium under three forces,
 (1) the resultant force of two forces should be in the same direction as that of the remaining force.
 (2) the resultant force of the three forces should be zero.
 (3) the three forces should be coplanar.
 (4) the lines of action of the three forces should meet at the same point.
6. In the urine filtration process taking place in kidneys, which of the following is filtered into the glomerulus from blood?
 (1) blood cells (2) plasma proteins (3) glucose (4) platelets
7. The typical cell is
 (1) the structural and functional unit of life.
 (2) the cell that gives origin to some other cell.
 (3) the cell that can undergo division.
 (4) the constructed cell that contains all the organelles.
8. Which of the following equipments is based on the phenomenon of electromagnetic induction?
 (1) Direct current motor (2) Loudspeaker
 (3) Electric bell (4) Moving coil magnetic microphone
9. Of the fruits shown in the following diagrams, which could be a fruit that has suitable adaptations to be dispersed by water?



(1)



(2)



(3)



(4)

[See page two]

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10. Consider the following statements about catalysts.

A - Catalysts increase as well as decrease reaction rates.

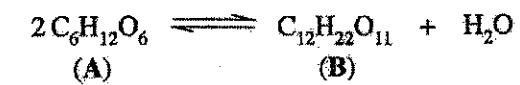
B - Though catalysts take part in the chemical reaction, they are not consumed during the reaction.

C - A small amount of the catalyst is adequate for a large amount of reactants.

Of the above, the true statements are,

- (1) only A and B. (2) only B and C. (3) only A and C. (4) all A, B and C.

11. Consider the following equation.

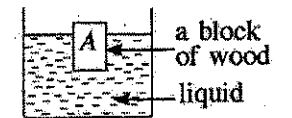


Select the option that gives appropriate examples for A and B in the above equation.

	A	B
(1)	glucose	maltose
(2)	glucose	cellulose
(3)	fructose	starch
(4)	fructose	glycogen

12. When a block of wood A is placed in a liquid, it floats with a part immersed.

Which of the following is the true statement in relation to this?



- (1) The upthrust exerted by the liquid on A is equal to the total weight of A.
 (2) The weight of the liquid displaced by A is equal to the weight of the part of A immersed in the liquid.
 (3) The volume of the liquid displaced by A is equal to the total volume of A.
 (4) The density of A is equal to the density of the liquid.

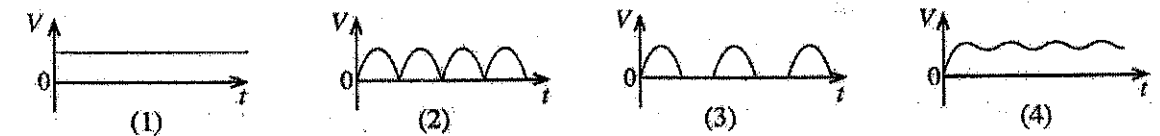
13. Which option correctly indicates the main functions of xylem and phloem tissues in a plant?

	Xylem	Phloem
(1)	Transport of water	Mechanical support
(2)	Mechanical support	Transport of water
(3)	Transport of water	Translocation of food
(4)	Translocation of food	Mechanical support

14. Which of the following oxides does **not** take part in the extraction process of iron?

- (1) CaO (2) MgO (3) CO₂ (4) SiO₂

15. An alternating voltage was subjected to full wave rectification followed by smoothing by a capacitor. Which of the following graphs illustrates the variation of the output voltage (V) with time (t)?



16. What is the phenotype ratio obtained, when two organisms with the genotypes Tt and tt were crossed?

- (1) 1:1 (2) 2:1 (3) 3:1 (4) 1:2:1

17. The relative molecular mass of the hormone adrenaline is 183. Thus, X in the relationship

$$183 = \frac{\text{mass of an adrenaline molecule}}{X} \text{ represents,}$$

- (1) mass of a ¹²C atom. (2) $\frac{1}{12}$ × mass of a ¹²C atom.
 (3) 12 × mass of a ¹²C atom. (4) $\frac{1}{12}$ × molar mass of ¹²C.

[See page three

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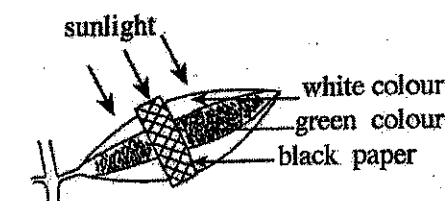
18. Consider the following aqueous solutions of equal concentration.

- (a) NaOH (b) NH_4OH (c) CH_3COOH (d) HCl

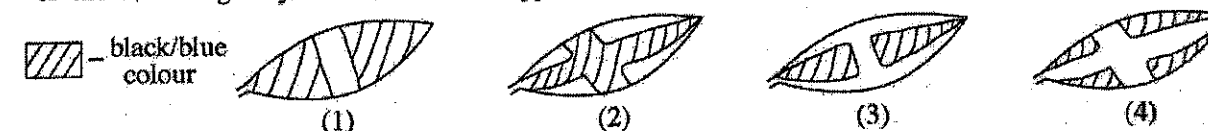
Select the option which indicates the increasing order of their pH correctly.

- (1) $c < d < b < a$ (2) $d < c < b < a$ (3) $c < d < a < b$ (4) $d < a < b < c$

19. A plant leaf with colours white and green, while attached to the plant, was set out as follows and kept in an open place.



After two days, the leaf was detached from the plant and tested for starch. After the test, in which of the following ways would the leaf appear?



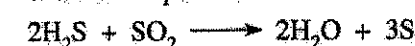
20. What is the option that correctly indicates all the species contained in an aqueous solution of hydrochloric acid?

- (1) $\text{H}_2\text{O}, \text{H}^+, \text{HCl}, \text{Cl}^-$ (2) $\text{H}_2\text{O}, \text{H}^+, \text{OH}^-, \text{Cl}^-$ (3) $\text{H}^+, \text{OH}^-, \text{HCl}, \text{Cl}^-$ (4) $\text{H}_2\text{O}, \text{H}^+, \text{OH}^-, \text{HCl}$

21. The total number of atoms in one mole of CO_2 molecules is

- (1) $6.022 \times 10^{23} \times 3$ (2) $6.022 \times 10^{23} \times 2$ (3) $6.022 \times 10^{23} \times 1$ (4) $6.022 \times 10^{23} \times \frac{1}{3}$

22. Hydrogen sulphide (H_2S), reacts with sulphur dioxide (SO_2) according to the following balanced chemical equation.

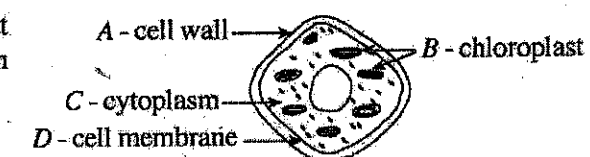


The amount of moles of sulphur dioxide that reacts with one mole of hydrogen sulphide is

- (1) 0.5 (2) 1.0 (3) 1.5 (4) 2.0

23. Given here is a diagram of a plant cell. What are the parts indicated in it that are seen in animal cells as well?

- (1) A and B (2) A and D
(3) B and C (4) C and D



24. Consider the following statements about the compounds, carbon dioxide and sulphur dioxide.

- A - They are acidic oxides.
B - They exist as gases under room temperature.
C - They are colourless.

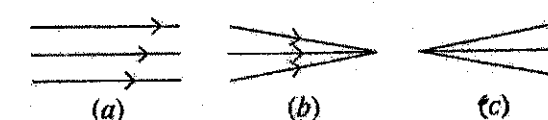
Of the above, the true statements are,

- (1) only A and B. (2) only B and C. (3) only A and C. (4) all A, B and C.

25. In the following figure, a, b and c are three beams of light.

Using a glass lens, one of these beams can be converted into another type of beam that is shown in the diagram. Which of the following statements correctly indicates this conversion?

- (1) 'a' to 'b' using a convex lens.
(2) 'a' to 'b' using a concave lens.
(3) 'b' to 'a' using a convex lens.
(4) 'c' to 'a' using a concave lens.



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26. Consider an instance where a convex lens is used to read a label with very small letters. Here, the label should be placed,
- (1) between the lens and its focus.
 - (2) on the focus of the lens.
 - (3) on a point which is away from the lens twice its focal length.
 - (4) on a point which is away from the lens more than twice its focal length.

27. Some features observed when an animal was examined are as follows:

- Has four pentadactyl limbs
- Has a glandular skin
- Has a broad mouth
- Cold-blooded

This animal could be the

- (1) otter.
- (2) crocodile.
- (3) tortoise.
- (4) toad.

28. A tightly stoppered, half-filled bottle of soda water was taken out from a refrigerator and kept outside until it reaches the room temperature. When kept like this, the mole fraction of carbon dioxide,

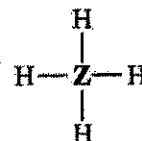
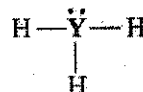
- (1) increases in phases both A and B.
- (2) decreases in phases both A and B.
- (3) increases in phase A; decreases in phase B.
- (4) decreases in phase A; increases in phase B.



29. In respiration of living organisms, oxygen gas and carbon dioxide gas exchange at the respiratory surface. Accordingly, the respiratory surface of the human is
- (1) nasal cavity.
 - (2) lungs.
 - (3) alveolar wall.
 - (4) alveolus.

30. The Lewis structures of the hydrides of the three elements X, Y and Z are given here.

Which elements in the table are represented by X, Y and Z?



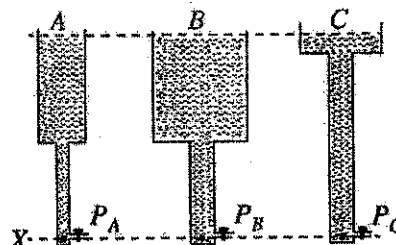
	X	Y	Z
(1)	C	N	O
(2)	O	N	C
(3)	N	O	C
(4)	C	O	N

31. A small glass ball and a big iron ball were dropped on to a porcelain surface from the same height. The porcelain surface cracked at the point at which the iron ball hit it. No such crack was caused by the glass ball. Of the following, greatness of which quantity of the iron ball than that of the glass ball could be the reason for this?

- (1) velocity
- (2) volume
- (3) momentum
- (4) acceleration

32. As shown in the figure, water is filled to the same height from level X in three tanks, A, B and C which are different in breadth. Which of the following is correct about the pressures P_A , P_B and P_C of the three tanks at level X?

- (1) $P_A > P_B > P_C$
- (2) $P_C > P_B > P_A$
- (3) $P_B > P_A = P_C$
- (4) $P_A = P_B = P_C$



33. The number of electrons and the number of neutrons in the ion indicated by the symbol $^{23}_{11}\text{Na}^+$ respectively are,

- (1) 11 and 23.
- (2) 10 and 23.
- (3) 10 and 12.
- (4) 11 and 12.

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34. What characteristic given below should be studied to distinguish as **living** and **non living** the specimens; a fertilized egg, a piece of meat, a bean seed obtained before germination and a dry piece of a branch of a plant?

(1) growth (2) respiration (3) reproduction (4) cellular organisation

35. An electric lamp bulb of a motor car is labelled 12 V, 0.5 A. Consider the following statements about those values.

A - When an electrical supply of 12 V is given across the bulb, the current flowing through it is 0.5 A.

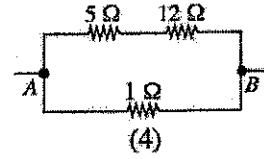
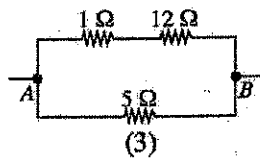
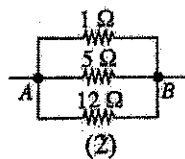
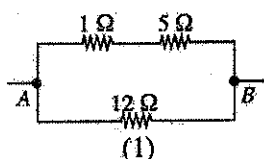
B - When the bulb operates normally, its power is 12×0.5 W.

C - The resistance of the bulb is $\frac{12}{0.5} \Omega$.

Of the above, the correct statements are,

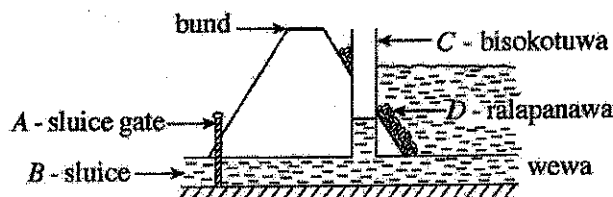
(1) only A and B. (2) only B and C. (3) only A and C. (4) all A, B and C.

36. Which diagram correctly indicates the connection of 1Ω , 5Ω and 12Ω resistors so that the equivalent resistance between A and B is 4Ω ?



37. The diagram illustrates a cross section across the bund close to the sluice of a wewa (tank). What is the structure constructed to reduce the speed of water flow by reducing pressure, when water is released from the tank?

(1) A (2) B
(3) C (4) D



38. Some activities carried out after felling trees in a forest are given below. Among them, which one contributes most to increase the carbon dioxide percentage in the atmosphere in a short period of time?

(1) Growing vegetable crops in the area (2) Letting cut down parts decompose naturally
(3) Using parts of timber for constructions (4) Burning the parts cut down

39. It has been planned to hold a conference in Sri Lanka in May/June 2019, on a convention/treaty dealing with regulations related to the trade of endangered plants and animals. By what name is that convention/treaty known?

(1) Ramsar (2) Montreal (3) CITES (4) Reo

40. Reduce, Reuse and Recycle are three, out of the principles used in waste/energy management. Which of the following is **not** a suitable example for "Reduce" given here?

(1) Switching off unnecessary electric lamps
(2) Eating all the food served for self
(3) Closing the unnecessarily opened water taps
(4) Refraining from using polythene

* * *

OL/2018/34/E-II

සියලු ම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது / All Rights Reserved

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
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Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka
ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
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34 E II

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2018 දෙසැම්බර්
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2018 டிசெம்பர்
General Certificate of Education (Ord. Level) Examination, December 2018

විද්‍යාව II
விஞ்ஞானம் II
Science II

08.12.2018 / 0830 - 1140

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

අමතර කියවීමේ 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 and decide on the questions that you give priority in answering.

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. Figure 1 given below illustrates the setting of a factory located close to a settlement area and its surroundings. A few years after the commissioning of the factory, environmental problems emerged in the area.

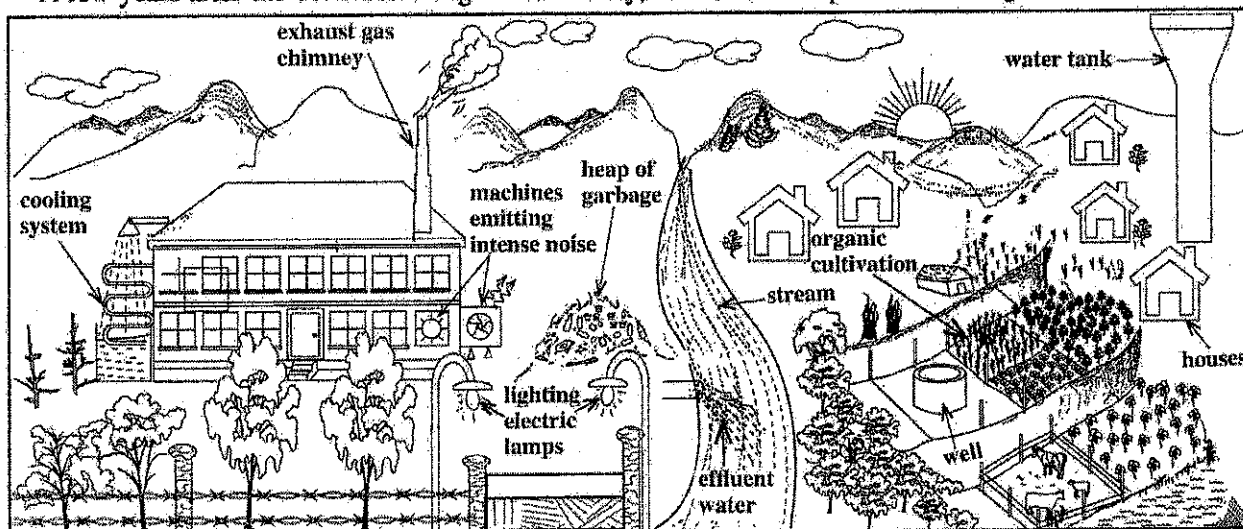


Figure 1

- (i) State two instances in which loss of energy occurs in relation to the factory as illustrated in the Figure.

• lighting electrical lamps (during day time.) • (machines) emitting intense noise

(a)
(b) intense noise • removing heat (through the cooling system.) • burning fuel (unnecessarily)

Give marks for any 2 answers.

- (ii) Write two problems leading to environmental pollution which may emerge due to this factory.

• collecting/ dumping garbage (in the environment)
• adding effluent water to the stream

(a)
(b) intense noise/ sound pollution • emission of exhaust gases to the atmosphere
• emitting heat to the environment/ thermal pollution

Give marks for any 2 answers.

Number of fish

- (iii) A group of students counted once in six months, the number of fish living in a specific area down the stream, and plotted a graph. That growth curve was found to differ from the typical population growth curve and assume the shape shown by letter a in Figure 2.

In which phase does the number of fish begin to decrease in the fish population? high growth phase/ exponential phase/ phase II/ Log. Phase

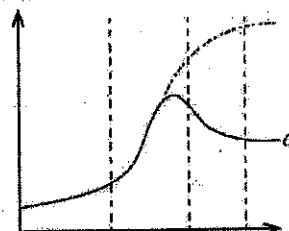


Figure 2 Time

- (iv) In the stream studied, the factors—the number of fish, temperature of water and the amount of heavy metals added to the stream—were measured for a period of about four years. Figure 3 shows the result of it. What factor can be given as the nearest cause for the decrease in the fish population as shown in Figure 3?

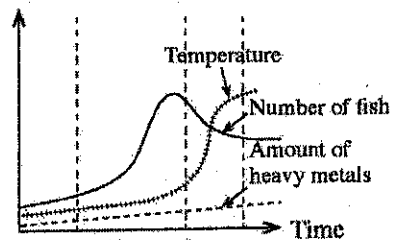


Figure 3

- (v) After some time, because of the entry of heavy metals into the blood of the people living in the settlements around the factory, they were subject to nervous disorders. Write schematically, using arrows, the instances of the process in which the heavy metals get into the blood like this.

- effluent water $\xrightarrow{\text{heavy metals}}$ stream $\xrightarrow{\text{water}}$ drinking water $\rightarrow$ blood / man / human
- effluent water $\rightarrow$ stream $\rightarrow$ crop cultivation $\rightarrow$ food $\rightarrow$ blood
- effluent water $\rightarrow$ stream $\rightarrow$ fish $\rightarrow$ food $\rightarrow$ blood
- effluent water $\rightarrow$ stream $\rightarrow$ aquatic plant $\rightarrow$ food $\rightarrow$ blood
- effluent gases $\rightarrow$ air / water $\rightarrow$ respiration $\rightarrow$ blood any one of the above in order (02)

- (vi) State an importance of maintaining the organic cultivation shown in Figure 1 as a poly-culture.

- reducing spreading of pests/ reducing spreading of diseases (in the cultivation)
- reducing forming pests with high resistance • protecting the nutrient balance in the soil
- reducing competition (for resources)

- (vii) Write two advantages of applying organic fertilizers for the cultivated land.

- (a) • increasing the soil texture/ ventilating the soil/ increasing the retention of water

- improving the soil structure • enhancing the activity of soil organisms/ favorable condition for soil organisms

- (b) • increasing the soil fertility/ increasing the soil moisture/ increasing the soil temperature

- (viii) From time-to-time, the waste products of the factory are sorted out and disposed. When the production of waste is high, they are mixed, piled up as garbage and disposed at a later stage. What is the advantage of disposing the factory waste separately from time-to-time than disposing them as garbage after mixing and piling up?

- waste management is easy • recycling (of waste) is easy • can be reused • reducing/ minimizing environmental pollution.

- (ix) In controlling the rise in global warming, as personal responsibilities it is important to minimize the environmental indicators such as one's carbon footprint, water footprint and food mileage. The people in the settlement consume flour made in the factory from cereals imported from abroad. By raising which environmental indicator given above do the people contribute to increase global warming by this practice?

food mileage

2. (A) The Figure shows a part of a concept map prepared incorporating some functions occurring in the human body and the structures relevant to them.

- (i) A is a digestive product containing only carbon, hydrogen and oxygen. Name it.

glucose/ $C_6H_{12}O_6$ (01)

Give marks even for writing monosaccharide or fructose/ galactose

- (ii) State a digestive product absorbed by the lacteal in the alimentary canal without being absorbed into blood.

.....fatty acids/ glycerol.....(01).....

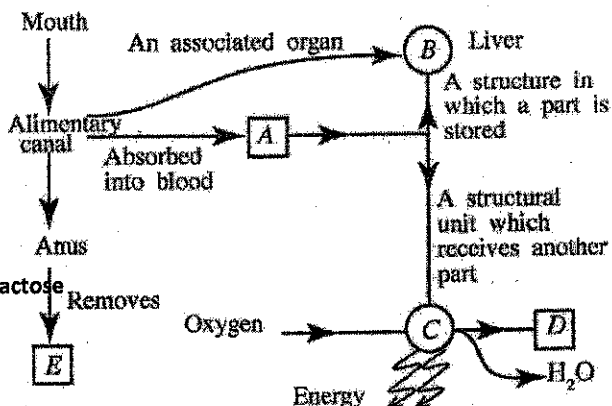
- (iii) A part of the nutrient A is stored in B (liver). Before this storing, it gets converted into another chemical substance. What is that chemical substance?glycogen..... (01)

- (iv) What structural unit is represented by C?cell/ mitochondrion..... (01)

- (v) D is produced as a product of a chemical process taking place in C. What is D?carbon dioxide / CO_2 (01)

- (vi) What is the reason for not considering E an excretory product?

not a product of metabolic activities / left overs of undigested food or not a product of biochemical reaction / not a product of cellular respiration



gas burns giving

- (vii) Four main processes taking place in the body relevant to the above concept map are given in the incomplete flow chart below. Fill in the blank boxes in it.



- (B) The Figure below indicates a part of a dicotyledonous plant with a leaf.

- (i) What is the main morphological feature that can be used to identify that this leaf belongs to a dicotyledonous plant?

....(reticulate) venation.....

- (ii) State a morphological feature of the root system of the plant to which this leaf belongs.

....having a tap root.....

- (iii) State a morphological feature in which the stem of a monocotyledonous plant differs from the stem of the plant to which this leaf belongs.

....unbranched / having a stem with uniform girth / same diameter / thickness.....

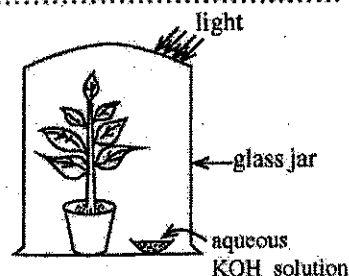
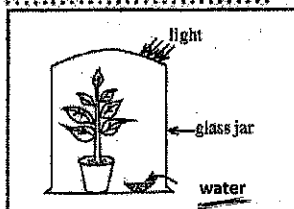


- (C) The Figure indicates an apparatus set up by a student for an experiment conducted with regard to photosynthesis.

- (i) Mention the aim of this experiment.

....testing whether CO₂ / carbon dioxide is needed for photosynthesis.....

- (ii) Draw a labelled sketch of a set-up of a control experiment suitable for this experiment in the given box.



3. (A) The following table presents in summarised form, incomplete information relevant to the preparation of three gases and tests for their identification. Complete the table using words or correct symbols/formulae as appropriate.

Method of preparation	Substances left in the reaction mixture after the reaction	Test carried out on the gas	Observation	Gas produced
Adding (i) hydrogen peroxide / H ₂ O ₂ drop-wise on (01) manganese dioxide solid	Water and (ii) manganese dioxide / MnO ₂ (01)	Holding a glowing splint	Glowing splint lighted	(iii) O ₂ / ... oxygen (01)
Adding dilute (iv) hydrochloric / HCl acid on (01) zinc / Zn (v) metal (01)	Zinc chloride aqueous solution	Holding a lighted ekle	(vi) (gas burns) giving "pop" sound (01)	Hydrogen
Adding dilute sulphuric acid to (vii) magnesium carbonate / MgCO ₃ (01)	Magnesium sulphate and water	(viii) passing the gas through (colourless) lime water / Ca(OH) ₂ (aq). No 'marks' for Ca(OH) ₂ only. (01)	(ix) (Colourless) lime water turns milky / white / turbid (01)	Carbon dioxide

- (B) Given here are the symbols of some of the first twenty elements in the Periodic Table and their locations in the Periodic Table.

H							He
Li					O	F	Ne
Na	Mg	Al				Cl	Ar
K	Ca						

- (i) Fill in the blanks in the following sentences using the elements given in the Table.

(a)helium / He..... is the element with maximum first ionisation energy.

(b)fluorine / F..... is the element of highest electronegativity.

(c) The electronic configuration of magnesium is2, 8, 2.....

(d) The formula of the compound formed by the combination of aluminium (Al) and oxygen (O) isAl₂O₃.....

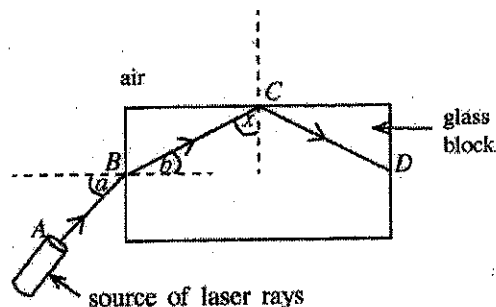
[See next four

- (ii) In the following sentences, select the appropriate word, out of the words given within parentheses and underline it.

(a) The bond of the compound formed between hydrogen and chlorine is (ionic/covalent/polar covalent).

(b) The oxide formed by the combination of aluminium and oxygen is (acidic/basic/amphoteric).

4. (A) In an activity related to light, a student placed a glass block on a white paper laid on a horizontal surface. Then, as shown in the Figure, he pointed a laser ray to the glass block along the plane of the paper. The path of the laser ray was marked A B C D.



- (i) By what name is the phenomenon known to which the ray is subjected after falling on point B?

.....refraction.....

- (ii) Write the names of the following angles in relation to the phenomenon occurring at point B.

Angle a :angle of incidence (01)..... Angle b :angle of refraction (01).....

- (iii) When the value of the angle ' a ' increases, how does the value of the angle ' b ' change corresponding to that?

.....(when (a) increases, (b) also) increases.....

- (iv) According to the Figure, what is the phenomenon to which the ray is subjected at point C?

.....total internal reflection.....

- (v) State a device that adopts the phenomenon you mentioned in (iv) above in modern communication technology.optic fibre.....

- (vi) If the angle between the ray BC and the normal at point C is x , is the angle x equal to, greater than or smaller than the critical angle of the glass-air interface?

x is greater (than the critical angle).

- (B) Two sets of apparatus arranged by a student to demonstrate a certain phenomenon related to heat are given here.

- (i) What is expected to be demonstrated by each of these set-ups?

Set-up A : ..(thermal) expansion of a liquid/ water (01)

Set-up B : ..(thermal) expansion of a gas/ air.....(01)

- (ii) When heated for some time, what changes can be seen in the narrow glass tubes in the above two set-ups?

Set-up A : rising the water level in the tube/ goes down slightly and rises up (01)

Set-up B : ..(coloured) drop of water rises up.....(01)

- (iii) By what method is heat transferred across the wall of the boiling tube in set-up B?

.....(thermal) conduction / radiation.....

- (iv) The mass of water in the boiling tube and the water in the glass tube connected to it in set-up A was 50 g. Initial temperature of that water was 30 °C. If that mass of water got heated up to 40 °C, calculate the quantity of heat absorbed by water. (Consider the specific heat capacity of water is 4200 J kg⁻¹ °C⁻¹).

$$\text{mass of water } m = \frac{50}{1000} \text{ (kg)} \quad (01)$$

$$\text{amount of heat absorbed } Q = mc\theta \quad (01)$$

$$= \frac{50}{1000} \text{ (kg)} \times 4200 \text{ (J kg}^{-1} \text{ °C}^{-1}) \times 10 \text{ (°C)} \quad (01)$$

$$2100 \text{ J} \quad (01)$$

* *

Part B

- Of the questions No. 5, 6, 7, 8 and 9, answer three questions only.

5. (A) Human reproductive process is coordinated by chemical substances known as hormones associated with the reproductive system.

- (i) State separately in relation to each system, a hormone secreted by the male and female reproductive systems which coordinates their functioning.

Figure 1 shows the phases of the female reproductive cycle. It separately illustrates how the changes of hormone concentration in blood, changes in the ovary and changes in the uterine wall occur during 28 days of the cycle.

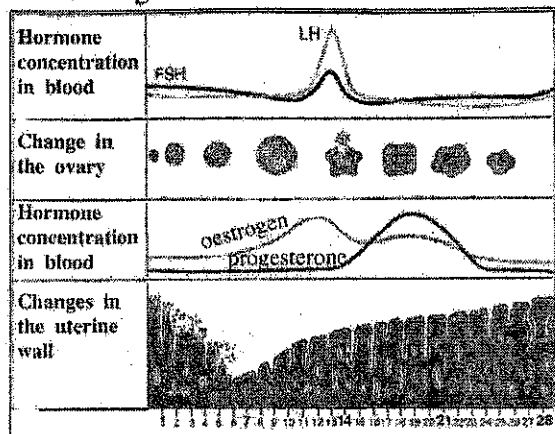


Figure 1

- (ii) According to the Figure, from which day does the menstrual phase of the female reproductive cycle start?
- (iii) Name a hormone secreted by the pituitary gland that affects the functioning of this cycle.
- (iv) What is the main phenomenon that occurs in the ovary by about the 14th day of the cycle?
- (v) During which time interval of the cycle is there a greater chance for the fertilization of the ovum?
- (vi) Write in two steps, what happens in the course of a fertilized human ovum becoming an embryo.
- (vii) State a common disease caused by a species of bacteria that is sexually transmitted and has become a social menace.

(B) (i) A person scared by a snappy dog starts running. Which two systems do the electrical and chemical coordination relevant to this?

- (ii) Using the relevant parts in Figure 2, write schematically using arrows, the connection from the receptor to the effector in the system relating to electrical coordination in (i) above.
- (iii) State one function carried out by the adrenal gland in relation to the coordination process.

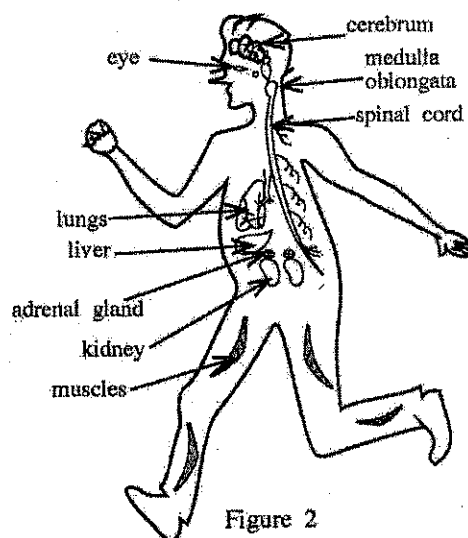


Figure 2

(C) (i) Given as A, B, C and D in Figure 3 are optical microscope diagrams of some plant and animal tissues you have studied. Write the names of the tissues A, B, C and D correctly, identifying their structural features.

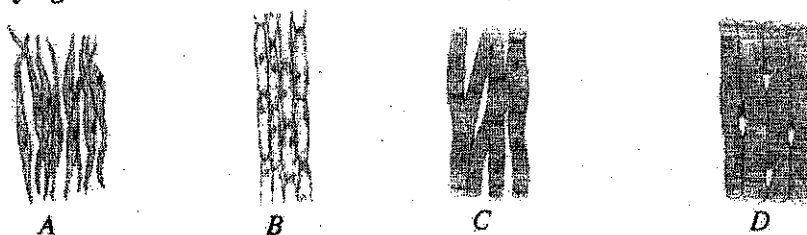


Figure 3

- (ii) What common feature could be seen in a tissue when various plant and animal tissues are observed?

(Total marks 20)

[See page six]

5	(A)	(i)	male :- testosterone (01) female :- oestrogen/ progesterone (01) Give marks even for writing answers in order.	02
		(ii)	from the day 01 or at the end of the day 28	01
		(iii)	- FSH/ Follicle Stimulating Hormone - LH/ Luteinizing Hormone for one answer	01
		(iv)	ovulation / describing the ovulation / releasing ovum.	01
		(v)	between day 14 and day 21	01
		(vi)	- Cell division/ cell differentiation/ becoming a morula/ implantation ^{Increasing the # of cells.} (01) - Implantation (01) / Cleavage. (01)	02
		(vii)	syphilis/ gonorrhoea	01
	(B)	(i)	- nervous system (01) ^{central nervous sys / Perifereral Nsys} - endocrine system (system of ductless glands) (01) ^{Symptothetic Nervous sys}	02
		(ii)	eye → cerebrum → spinal cord → muscles - when all steps are written completely - 03 marks - when cerebrum / spinal cord of the above steps are not mentioned - 02 marks - for any other answers - 00 marks	03
		(iii)	secretion of adrenaline hormone / Not adrenaline	01
	(C)	(i)	A - smooth muscle (tissue) (01) B - parenchyma (plant tissue) (01) C - cardiac muscle (tissue) (01) D - skeletal muscle (01) <i>If the answers are written in correct order give marks.</i>	04
		(ii)	consisting of identical cells (mostly) ^{similar}	01
	Total marks			20

6. (A) Natural rubber is a polymer.

(i) Name the monomer which natural rubber is made up of.

(ii) Natural rubber is vulcanized by heating rubber with sulphur to a certain temperature.

(a) Mention the structural change that occurs in natural rubber during vulcanization.

(b) State two changes in the properties of natural rubber brought about by the structural change you stated in part (a) above.

(c) Name one pollutant causing global warming and one pollutant causing acid rain which are added to air when vulcanized tyres are bunt in air (The pollutants causing respective effects should be written clearly and separately).

(B) The LP gas cylinders used for domestic cooking mainly contain propane and butane; both belonging to the hydrocarbon group.

(i) What is meant by 'hydrocarbons'?

(ii) (a) To which series of hydrocarbons do propane and butane belong?

(b) What is the common formula related to the hydrocarbon series you stated above?

(iii) The balanced chemical equation relevant to the complete combustion of butane is as follows.



Write the values relevant to 'x' and 'y' in the above equation.

(iv) The balanced chemical equation for the combustion of propane is given below.



(a) Is the above reaction exothermic or endothermic?

(b) Sketch an energy level diagram for the above reaction indicating clearly the relative positions of reactants and products.

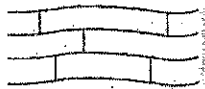
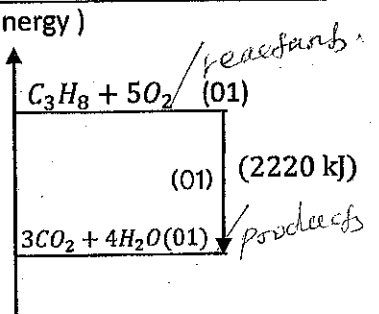
(C) Given in the box below are several techniques used to separate components in mixtures.

- | | | |
|-------------------|-----------------------|---------------------------|
| ● Sifting | ● Recrystallisation | ● Fractional distillation |
| ● Filtration | ● Solvent extraction | ● Steam distillation |
| ● Crystallisation | ● Simple distillation | ● Chromatography |

Write separately, which technique given in the above box is most suitable to fulfil the requirements (i), (ii), (iii) and (iv) given in the first column of the following table.

	Requirement	Chemicals provided	Extra information
(i)	Obtaining pure potassium chlorate crystals from a sample of potassium chlorate salt contaminated with a small amount of common salt	water	Potassium chlorate is more water-soluble at higher temperatures than at lower temperatures.
(ii)	Obtaining most of the iodine dissolved in a volume of water as pure crystals of iodine	diethyl ether	Diethyl ether is a volatile solvent immiscible with water. Iodine is more soluble in diethyl ether than in water.
(iii)	Identifying three colourings supposed to have been added to a food material	ethanol	The relevant food colourings are soluble in ethanol.
(iv)	Separating hexane and octane from a mixture formed by mixing the liquids hexane and octane	—	Hexane and octane are miscible liquids. Boiling point of octane is higher than the boiling point of hexane.

(Total marks 20)

6	(A)	(i)	isoprene / if correct str / formula written - can give marks.	01	
		(ii)	(a)	formation of cross links (among linear chains) of rubber (through sulphur) or 	02
		(b)	- increasing the hardness, decreasing the elastic nature / increasing elasticity - increasing the melting point / resistant to wear and tear - swelling to pressure withstanding 01 mark for each answer	02	
		(c)	increasing global warming- carbon dioxide / CO ₂ (01) acid rains- sulphur dioxide / SO ₂ / oxides of sulphur (01) Give marks even when these answers are written in order.	02	
	(B)	(i)	(organic) compounds which contain carbon and hydrogen <u>only</u>	01	
		(ii)	(a)	alkane (group)	01
		(b)	C _n H _{2n+2}	01	
		(iii)	x = 2 (01) y = 8 (01) give marks if the H's are written in correct order	02	
		(iv)	(a)	exothermic	01
		(b)	(energy) 	03	
(C)	(i)	recrystallisation (01)			
	(ii)	solvent extraction (01)			
	(iii)	chromatography (01)			
	(iv)	fractional distillation (01)	04		
Total marks				20	

OL/2018/34/E-II

- 7 -

7. (A) A tall, cuboidal block of wood of mass 800 g was placed on a horizontal table.

- (i) (a) Calculate the weight of this block of wood.
(Consider acceleration due to gravity, $g = 10 \text{ ms}^{-2}$.)
- (b) The force exerted by the block of wood on the table is equal to the weight of the block of wood. How much is the reaction exerted on the block of wood by the table?
- (c) Name the Newton's law of motion that is relevant to the phenomenon by which the answer for (b) above was obtained.
- (ii) (a) Of points A and B, which is suitable to apply a force in order to move the block of wood horizontally on the table as shown in Figure 1?
- (b) State the reason for your answer above.

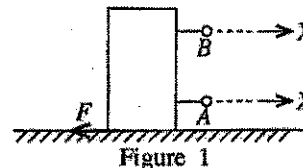


Figure 1

- (iii) Of A and B above, a Newton balance was connected to the suitable point and a gradually increasing horizontal force X was applied. The frictional force F exerted on the block of wood was plotted against the force X. Then, the graph shown in Figure 2 was obtained.

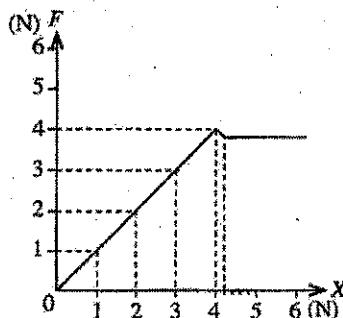
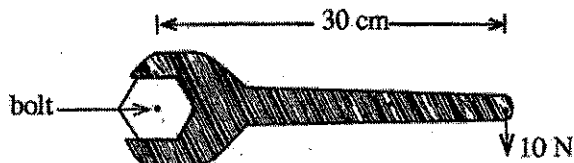


Figure 2

- (a) By what name is the frictional force exerted on the block of wood known, when the force X exerted on it is 3 N?
- (b) What is the limiting frictional force exerted on the block of wood as indicated in the graph?
- (iv) It was required to drag a large block of wood along a flat, rough surface. State two different methods that can be used to reduce the friction between those surfaces.
- (v) The mass of the block of wood mentioned in (iv) above is 200 kg. Calculate the acceleration of the block of wood in the direction of the force when an unbalanced force of 100 N is applied on it.
- (vi) That block of wood moved through a distance of 4 m under the unbalanced force mentioned in (v) above. How much is the effective work done in this motion?

(B) The Figure below illustrates an instance where a bolt is tightened using a spanner.



- (i) (a) Calculate in SI units, the moment of force exerted on the shaft of the spanner using the data given in the Figure.
- (b) In which direction does the head of the bolt rotate in the instance given in the above Figure?
- (ii) Suggest a suitable method to increase that moment of force, while using the same spanner and applying the same force of 10 N.

(Total marks 20)

(See next page)

7	(A)	(i)	(a)	weight of the block of wood $W = mg$ $= \frac{800}{1000} \text{ (kg)} \times 10(\text{ms}^{-2})$ (01) $= \underline{8 \text{ N}}$ (01)	02	
			(b)	8 N <i>If the answer is wrong in (a), but correctly brought it down can give marks.</i>	01	
			(c)	Newton's third law/ writing the law correctly <i>Every action has an equal & opposite rⁿ.</i>	01	
		(ii)	(a)	A	01	
			(b)	• (The more colinear the applied force and the frictional force against it) the tendency for toppling the block of wood is less. <i>less tendency for toppling due to decreasing momentum.</i>	01	
			(iii) (a)	static frictional force	01	
			(b)	4 N	01	
		(iv)		- smoothing the surface - applying a lubricant (oil/ grease) between surfaces - inserting ball (bearings) or roller (bearings) between the contact surfaces <i>or correct illustrations</i> For any two answers	02	
			(v)	$F = ma$ <i>(a = $\frac{F}{m}$)</i> (01) $a = \frac{F}{m} = \frac{100(\text{N})}{200(\text{kg})}$ (01) $= 0.5 \text{ ms}^{-2}$ <i>$\frac{1}{2} \text{ ms}^{-2}$</i> (01)	03	
		(vi)		$W = Fd$ (01) or work done = force x distance travelled in the direction of force $= 100 \text{ (N)} \times 4 \text{ (m)}$ (01) $= \underline{400 \text{ J / Nm}}$ (01)	03	
			(B)	(i)	(a)	moment of force = force x perpendicular distance (to the axis of rotation) moment of force $= 10 \text{ (N)} \times \frac{30}{100} \text{ (m)}$ (01) $= \underline{3 \text{ Nm}}$ (01)
		(b)			clockwise/	01
		(ii)			increasing the length of the shaft of the spanner/ for a method to increase the length	01
				Total marks	20	

U/L/2018/P/12/11

8. (A) Cockroach and gecko can be identified as two common organisms living in the homes of Sri Lanka.

(i) In classification, cockroach and gecko have been classified into two main groups of animals. What is the main internal feature that has been used for this classification?

(ii) (a) Cockroach is an arthropod. Apart from having jointed appendages, state another morphological feature belonging to that group of organisms.

(b) Gecko is a reptile. What is the specific feature seen in this group of organisms as an adaptation to the terrestrial life?

(iii) In the skeleton of these two organisms, state

(a) a difference in the way it is positioned,

(b) a similarity by function.

(B) Fungi are classified as a separate kingdom.

(i) How does the fungal cell wall differ from the plant cell wall?

(ii) What is the mode of nutrition in fungi?

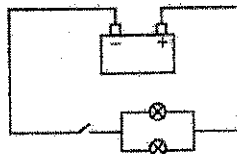
(C) Scientific name of the paddy plant is written as *Oryza sativa*.

As illustrated in this, write two rules adopted when naming organisms scientifically.

(D) It is stated that the voltage of a motor car battery is 12 V. This battery comprises six electrical cells; voltage of each is 2 V.

(i) Using circuit symbols, draw how the six cells are combined to make the battery.

(ii) The two head lamps of the motor car are identical and the Figure indicates how they are connected to the battery.



(a) Name how the two lamp bulbs are connected.

(b) Show in a diagram, the other way of connecting the two lamp bulbs.

(c) What is the advantage of connecting the two lamp bulbs as shown in the given Figure?

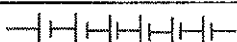
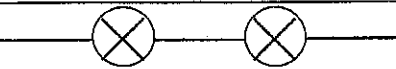
The resistance of each lamp bulb shown in the Figure is 2Ω .

(iii) Calculate the equivalent resistance of the two lamp bulbs.

(iv) Find the electric current flowing through one lamp bulb when the circuit is put on closing the key.

(v) Calculate the current flowing through the other bulb if one bulb gets burnt.

(Total marks 20)

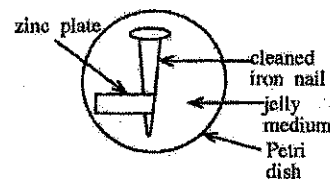
8	A	(i)	vertebral column / endoskeleton/ backbone	01	
		(ii)	(a)	• having an exoskeleton • (segmented body parts collectively join) forming a tagma • <i>continuous cuticle / exoskeleton</i>	01
			(b)	dry skin / skin without glands Give marks even for writing the features given below. • respiration by lungs, pentadactyl limbs, internal fertilization	01
			(iii)	(a)	cockroach - exoskeleton gecko - endoskeleton
		(b)		support / protection	01
		B	(i)	made of chitin	01
			(ii)	heterotrophic/ saprophytic <i>+1 free mark</i> Give a free marks for this part.	01
		C		• writing in two words • writing the generic name first and specific <i>epithet</i> name second • only the first letter of the generic name is capitalized • printing both words in italics • writing both words in Roman (English) script (for any two)	02
			D	(i)	 (all 6 cells) Give marks even if the cells are not connected.
			(ii)	(a)	in parallel
			(b)	 for this part or for the whole circuit with this part	01
			(c)	One bulb lights up even if the other bulb is blown off. <i>lighte baghter compare</i> <i>in series</i>	01

		(iii)	$\frac{1}{R} = \frac{1}{r_1} + \frac{1}{r_2}$ or (01) $= \frac{1}{2} + \frac{1}{2}$ $\therefore R = 1\Omega \text{ (01)}$	02
		(iv)	total current $I = \frac{V}{R} = \frac{12(V)}{1(\Omega)} = 12 \text{ A}$ using the equation or obtaining 12 A (01) $\therefore \text{current flowing through one bulb} = \frac{12(A)}{2} = 6A \text{ (01)}$	02
		(v)	$I = \frac{V}{R} = \frac{12(V)}{2(\Omega)} = 6A \text{ (01)}$ (01)	02
			Total marks	20

9. (A) (i) L and M are two metals which form only dipositive cations. When metal L is added to an aqueous solution of the sulphate of metal M (MSO_4), metal L gradually diminishes while metal M precipitates. (L and M are not standard symbols. When writing answers, use symbols L and M.)

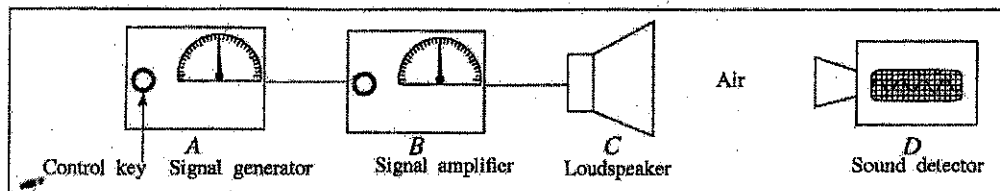
- Write the balanced chemical equation relevant to the chemical change stated above.
- Name the type of chemical change to which the reaction written in (a) above belongs.
- Of the two metals L and M, which metal is placed above in the activity series?

- (ii) Figure of a set-up arranged by a student to examine the effect of other metals on the corrosion of iron is given here. The jelly medium in this contains sodium chloride, phenolphthalein, potassium ferricyanide, water and agar.



- When observed after a few hours, what colour can be observed in the jelly medium near the iron nail?
 - What is the ion which causes that colour change?
- Write the balanced ionic equation for the half-reaction that occurs near the zinc plate.
- What is the reason for adding sodium chloride to the jelly medium in this experiment?
- Which metal acts as the cathode in this experiment?
 - State a practical application related to this experiment.

- (B) A set-up of apparatus arranged to study about sound waves is given in the Figure.



- A - Signal generator - Produces electrical signals of various frequencies. Control key changes the frequency of the signal generated.
 - B - Signal amplifier - Increases the amplitude of the signal received from the generator. Its control key can control the amplification.
 - C - Loudspeaker - Converts the electrical signal received from the amplifier into sound.
 - D - Sound detector - Records on the screen, the frequency and the amplitude of sound waves received from the loudspeaker.
- Indicate in hertz (Hz), the frequency range that has to be maintained to make the sound received from the loudspeaker sensitive to the human ear.
 - What is the characteristic that changes in the sound heard when the frequency is gradually increased within the above range?
 - What is the characteristic of sound that changes, when the amplitude is changed by the signal amplifier control key?
 - The sound emitted from the loudspeaker travels to the sound detector through air as a mechanical wave.
 - To which type of waves does this mechanical wave belong?
 - Explain briefly, the behaviour of air particles in the medium when these waves travel.
 - When the experiment was conducted keeping the detector at a distance of 170 m from the loudspeaker, the sound emitted from the loudspeaker took 0.5 s to reach the detector.
 - Calculate the velocity of sound in air.
 - State whether the velocity of sound changes or doesn't change in the instances I and II below.
 - Changing the frequency of the signal
 - Changing the temperature of air

(Total marks 20)

* * *

9	(A)	(i)	(a)	$L + MSO_4 \longrightarrow LSO_4 + M$	02
			(b)	single displacement (reaction)	01
			(c)	L	01
		(ii)	(a)	I) pink/ red II) OH^- / hydroxyl/ hydroxide	01 01
			(b)	$Zn \longrightarrow Zn^{2+} + 2e$ Give marks also for $Zn - 2e \longrightarrow Zn^{2+}$	01
			(c)	to obtain observations quickly / to increase the rate of reaction / to increase the conductivity of the medium / to neutralize the medium <i>increasing the rate of corroding of zinc</i>	01
			(d)	I) iron / Fe II) <i>galvanizing iron/ give marks for stating that a sacrificing metal is connected to the hulls of ships/ underground pipes</i> <i>connecting</i> <i>wrapping needles with Al foil</i>	01 01
		(B)	(i)	20(Hz)– 20000(Hz)	01
			(ii)	pitch	01
			(iii)	loudness	01
		(iv)	(a)	longitudinal waves	01
			(b)	making rarefactions and compressions (in air particles) <i>vibration of that medium/air particles in the direction of the waves</i>	02
		(v)	(a)	speed = $\frac{\text{distance}}{\text{time}}$ or $= \frac{170(m)}{0.5(s)} = 340 \text{ ms}^{-1}$ (01) (01)	02
			(b)	I) Does not change II) Changes	01 01
				Total marks	20