OL/2025(2026)/34/E-I

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

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

34 E I

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2025(2026)
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2025(2026)
General Certificate of Education (Ord. Level) Examination, 2025(2026)

විද්‍යාව I
விஞ்ஞானம் I
Science I

For the use of Marking Examiners only.

පැය එකයි
ஒரு மணித்தியாலம்
One hour

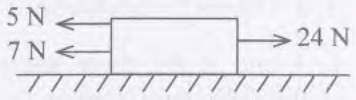
Instructions :

- *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 (×) 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. All biomolecules carbohydrates, proteins, lipids and nucleic acids contain,
(1) carbon, hydrogen and oxygen. (2) carbon, oxygen and nitrogen.
(3) hydrogen, oxygen and nitrogen. (4) carbon, hydrogen and phosphorus.

2. An organelle that can be seen when cheek cells are observed under the optical microscope is,
(1) Golgi complex. (2) mitochondrion. (3) nucleus. (4) ribosome.

3. On a block of wood placed on a smooth horizontal table, horizontal, parallel forces act as shown in the diagram. What is the resultant force acting on the object?



(1) 12 N to left (2) 12 N to right (3) 22 N to left (4) 22 N to right

4. The cause for the pain when stung by red ants is the formic acid which they apply on the sting. Application of which of the following on the sting is most effective to relieve the pain?
(1) salt water (2) water (3) lime water (4) vinegar

5. Of the following which statement is true?
(1) All non- flowering plants are gymnosperms.
(2) Flowering plants are also called gymnosperms.
(3) Monocotyledonous and dicotyledonous plants are commonly referred to as angiosperms.
(4) There are two groups of flowering plants as seed plants and seedless plants.

6. A cell, a tissue and an organ in the blood circulatory system respectively are,
(1) neutrophils, blood and blood vessels. (2) platelets, blood plasma and blood vessels.
(3) blood capillaries, arteries and heart. (4) eusinophils, blood capillaries and heart.

7. Which of the following species contains 10 electrons, 11 protons and 12 neutrons?
(1) $^{24}_{12}Mg^{2+}$ (2) $^{23}_{11}Na^{+}$ (3) $^{23}_{11}Na$ (4) $^{19}_{9}F^{-}$

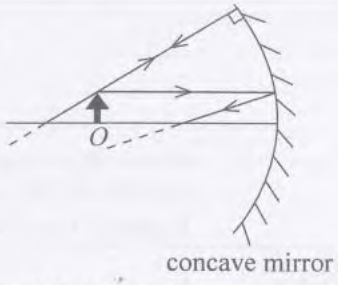
8. The essential oil methyl jasmonate is the cause for the fragrance of jasmine flowers. Which following method could be used to separate methyl jasmonate industrially from jasmine flowers?
(1) simple distillation (2) steam distillation
(3) fractional distillation (4) paper chromatography

9. Which pair of following disorders is an example for the genetic disorders caused by gene mutation?
(1) haemophilia and red-green colour blindness (2) haemophilia and albinism
(3) red-green colour blindness and thalassemia (4) albinism and thalassemia

10. Which of the following option correctly indicates a type of an underground stem and an example relevant to it?
(1) rhizome - manioc (2) corm - ginger
(3) bulb - sweet potato (4) stem tuber - potato

[*See page two*

11. The diagram shows the paths of a pair of rays emitted by an object '*O*' placed at a certain point on the principal axis perpendicular to it in front of a concave mirror. The image of this object is,



(1) real, inverted and magnified.
(2) real, inverted and equal to the object in size.
(3) real, upright and reduced.
(4) virtual, upright and magnified.

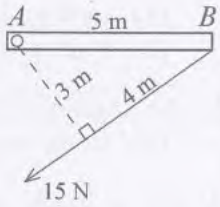
12. A transformer is supplied with a power of 690 W from a supply of 230 V. How much is the current supplied to the coil?

(1) 1 A (2) 2 A (3) 3 A (4) 4 A

13. Which option correctly indicates the nature of radio waves and waves created on a water surface?

	Radio waves	Waves on a water surface
(1)	transverse - mechanical	transverse - electromagnetic
(2)	transverse - electromagnetic	transverse - mechanical
(3)	longitudinal - mechanical	longitudinal - mechanical
(4)	longitudinal - electromagnetic	longitudinal - electromagnetic

14. A force of 15 N is applied by a light string tied to the end *B* of a light rod *AB* which is pivoted at point *A* as shown in the diagram. How much is the moment of force acting on the rod?



(1) (15×5) N clockwise (2) (15×5) N anti-clockwise
(3) (15×3) N clockwise (4) (15×3) N anti-clockwise

15. *X*, *Y* and *Z* are three successive elements in the periodic table and *X* is a noble gas. As which of the following species is *Z* most likely to exist in its compounds?

(1) Z^{+} (2) Z^{2+} (3) Z (4) Z^{-}

16. Four rules relating to electromagnetism and electromagnetic induction are given below.

A - Maxwell's corkscrew rule *B* - Right hand rule
C - Fleming's left hand rule *D* - Fleming's right hand rule

Of these, the two rules that can be used to find the direction of the magnetic field around a conductor carrying an electric current are,

(1) *A* and *B*. (2) *A* and *C*. (3) *B* and *C*. (4) *B* and *D*.

17. Consider the following statements.

A - An unbalanced force does not act on an object at rest freely suspended by a string.
B - An unbalanced force acts on an object moving with a uniform velocity.
C - The force exerted on the table by an object kept at rest on a horizontal table is equal to the force exerted by the table on the object in the opposite direction.

Of the above, the true statement/statements is/are,

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

18. Which of the following option is true about the muscle tissue shown in the figure?



(1) uninucleate, has cross striations, is not fatigued whatever
(2) multinucleate, no cross striations, is not fatigued whatever
(3) uninucleate, no cross striations, is fatigued on excessive action
(4) uninucleate, has cross striations, is fatigued on excessive action

19. Of the following factors essential for photosynthesis, which factor **cannot** be tested in the school laboratory?

(1) water (2) chlorophyll (3) light (4) carbon dioxide

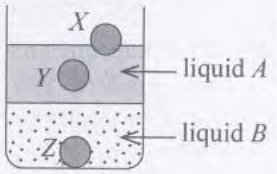
20. The hydrocarbon with molecular formula C_5H_{12},

(1) is an alkene.
(2) is a component of biogas.
(3) can be polymerised.
(4) forms 6 moles of water on complete combustion of one mole.

[*See page three*

21. The main reason for the easy flow of electrons across the p-n junction of a forward biased diode is,
(1) high energy in the electrons.
(2) very low value of the potential barrier.
(3) that the depletion region is very narrow.
(4) that the doping level is very low.

22. There are two immiscible liquids A and B whose densities are ρ_A and ρ_B respectively. Three solid spheres X, Y and Z equal in radius and with densities ρ_X, ρ_Y and ρ_Z respectively are in the liquids as shown in the diagram. What is the correct statement about them?



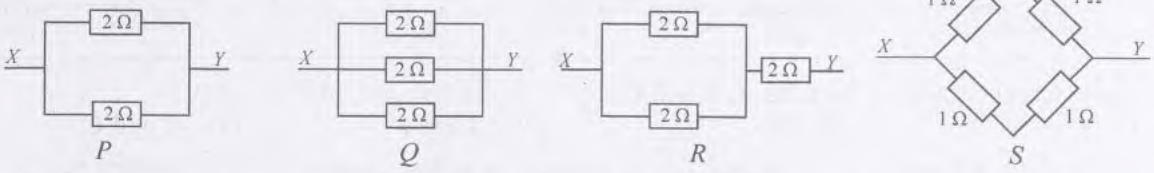
(1) $\rho_A < \rho_B$ and $\rho_X = \rho_Y < \rho_Z$
(2) $\rho_A < \rho_B$ and $\rho_X < \rho_Y < \rho_Z$
(3) $\rho_A = \rho_X = \rho_Y$ and $\rho_B < \rho_Z$
(4) $\rho_A = \rho_Y < \rho_X$ and $\rho_B = \rho_Z$

23. u, v and w are three metals lying above hydrogen in the activity series. The method proposed by a group of students to compare their activity was taking a piece from each metal, reacting them with hydrochloric acid separately and comparing the volumes of hydrogen gas liberated within a fixed short period. Which of the following factors is **not** essential to be kept constant during the experiment?
(1) surface area of the metals
(2) mass of the metals
(3) temperature of the reaction mixture
(4) acid concentration of the reaction mixture

24. During inspiration,
(1) intercostal muscles and the muscles in the diaphragm relax.
(2) intercostal muscles relax while muscles in the diaphragm contract.
(3) intercostal muscles contract while muscles in the diaphragm relax.
(4) intercostal muscles and muscles in the diaphragm contract.

25. Consider the following statements about amoeba.
A - Reproduction occurs by binary fission.
B - Binary fission occurs only by mitotic division.
Of the above statements,
(1) only statement A is true.
(2) only statement B is true.
(3) both statements A and B are true.
(4) both statements A and B are false.

26. Of P, Q, R and S, in which pair of resistor systems is the value of the equivalent resistance the same between X and Y?



(1) P and Q
(2) P and S
(3) Q and R
(4) R and S

27. Two metals Q and R react as indicated by the following equations.

$Q(s) + H_2SO_4(aq) \longrightarrow QSO_4(aq) + H_2(g)$

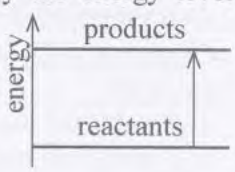
$R(s) + H_2SO_4(aq) \longrightarrow RSO_4(aq) + H_2(g)$

$R(s) + QSO_4(aq) \longrightarrow$ no reaction

Which of the following can be Q and R respectively?
(1) Cu and Zn
(2) Zn and Mg
(3) Mg and Cu
(4) Mg and Zn

28. A gas jar filled with a gas X was inverted and placed vertically in a beaker of water. Then, it was seen that the water level inside the gas jar rises rapidly. Gas X can be,
(1) Ne.
(2) N_2.
(3) CO_2.
(4) NH_3.

29. Which of the following is most likely to be the change represented by the energy level diagram given?
(1) dissolving of glucose in water
(2) combustion of the hydrocarbon, methane
(3) reaction between zinc and hydrochloric acid
(4) neutralization between sodium hydroxide and hydrochloric acid



[See page four

30. The heart beat of a person whose head was injured by an accident became irregular and respiration occurred without a control. He happened to vomit also. Thus, it can be inferred that in his brain,
(1) cerebellum is damaged.
(2) medulla oblongata (brain stem) is damaged.
(3) left cerebral hemisphere is damaged.
(4) right cerebral hemisphere is damaged.

31. The magnetic train operated in Japan is lifted a bit up above the rails after it acquires an adequate speed and made to run forward. What is the main advantage obtained by this modern technological strategy?
(1) minimizing train maintenance activities
(2) minimizing the wear of the rails
(3) minimizing air resistance acting on the train
(4) running the train under minimal friction

32. Two reactions used to prepare the gases H_2 and CO_2 in the laboratory are given below.

$Zn + 2HCl \longrightarrow ZnCl_2 + H_2$ $\quad$ $CaCO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + CO_2$

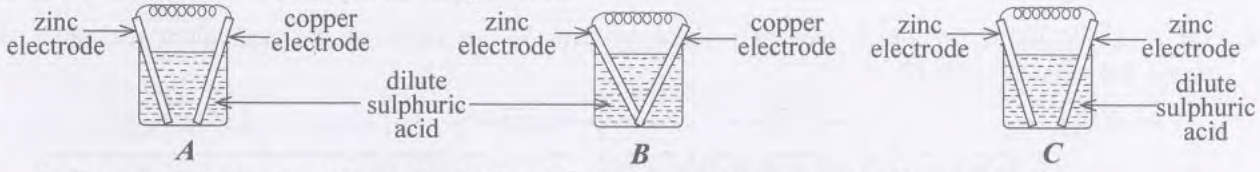
What is the mass of $CaCO_3$ that should be reacted to obtain an amount of moles of CO_2 gas which is equal to the maximum amount of moles of H_2 gas obtainable from 32g of zinc (Zn)? (H = 1; C = 12; O = 16; Ca = 40; Zn = 64)
(1) 22 g (2) 44 g (3) 50 g (4) 100 g

33. In the form of a thin layer, metal *X* is applied on the iron sheet *A* and metal *Y* is applied on the iron sheet *B*. A small scratch was made at the centre of both sheets. Later, rusting has spread rapidly on *A*, but *B* has not been subjected to a considerable damage. The metals *X* and *Y* respectively can be,
(1) Sn and Zn. (2) Zn and Sn. (3) Cu and Ag. (4) Ag and Cu.

34. 600 g of water at temperature 80°C were added to a vessel containing 200 g of water at 0°C. What is the final temperature of the mixture? (specific heat capacity of water = 4200 J $kg^{-1}°C^{-1}$; assume that the vessel does not absorb heat.)
(1) 53°C (2) 60°C (3) 66°C (4) 70°C

35. The areas of cross section of the pistons of a hydraulic jack are x m^2 and $4x$ m^2. How much is the force exerted on the larger piston when a force of 50 N is applied on the smaller piston?
(1) 50 N (2) 100 N (3) 150 N (4) 200 N

36. ***A***, ***B*** and ***C*** are three sets of simple cells.



In the external circuits of the cells ***A***, ***B*** and ***C*** above, an electric current flows only in,
(1) ***A***. (2) ***B***. (3) ***A*** and ***B***. (4) ***A*** and ***C***.

37. Which of the following is a disease which **cannot** be either controlled or prevented by changing the life style?
(1) diabetes
(2) gastritis
(3) chronic kidney disease
(4) haemophilia

38. In which phase of the growth curve of population does the number of organisms in the population reach its carrying capacity?
(1) first phase (2) second phase (3) third phase (4) fourth phase

39. Which of the following statements is true about the ecological pyramids?
(1) Number pyramids are always upright.
(2) In a biomass pyramid, omnivores can exist only as secondary consumers.
(3) Heavy metals accumulate most in the highest level of a biomass pyramid.
(4) Biomagnification is the incorporation of a higher amount of energy in the higher trophic levels of an energy pyramid.

40. As a student says, nitrogenous nutrients in a soil decrease after a flood due to following reasons.
A - occurrence of denitrification
B - percolation deeper into soil (leaching)
C - getting washed away from the surface soil
D - decomposition of organic matter
Of these only,
(1) *A*, *B* and *C* are true.
(2) *A*, *B* and *D* are true.
(3) *A*, *C* and *D* are true.
(4) *B*, *C* and *D* are true.

* * *

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

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

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අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2025(2026)
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2025(2026)
General Certificate of Education (Ord. Level) Examination, 2025(2026)

විද්‍යාව	II
விஞ்ஞானம்	II
Science	**II**

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පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

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

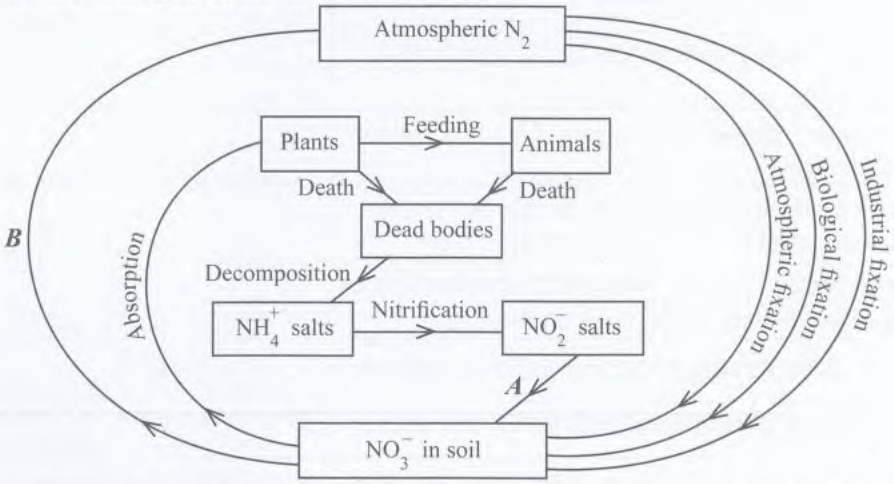
Use additional reading time to go through the question paper, select the questions you will answer and decide which of them you will prioritise.

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 handover.***

Part A

1. (*A*) A sketch of the nitrogen cycle is indicated below.



(i) By what name are the cycles such as nitrogen cycle and carbon cycle known in common?

.....

(ii) Name the processes ***A*** and ***B*** in the above nitrogen cycle.

(a) Process ***A***: .....

(b) Process ***B***: .....

(iii) (a) Under what environmental condition does the process ***B*** above occur?

.....

(b) State one special adaptation shown by some plants growing in the environments with the condition you mentioned in (a) above to satisfy their nitrogen requirement.

.....

(iv) What is the mode of nitrogen fixation relevant to each of the following instances?

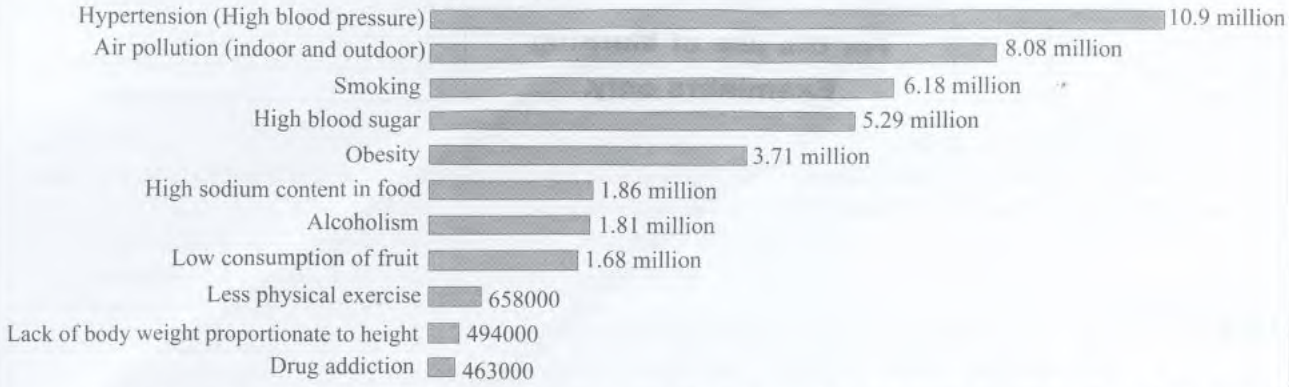
	Instance	Mode of fixation
(a)	Lightning	.....
(b)	Rhizobium living symbiotically in the root nodules of legumes	.....

[*See page two*

(v) As what nutrient is the nitrogen contained in the salts absorbed by plants transmitted to animals?

.....

(*B*) The number of deaths of people occurred in the year 2021 in the world due to various risk factors is indicated in the graph below.



Complete the following table taking the piece of information relevant to each of the following descriptions from the graph.

	Description	Piece of information
(i)	Risk factor causing the highest number of deaths	.....
(ii)	Number of people died due to indoor and outdoor air pollution	.....
(iii)	Total number of deaths occurring due to alcoholism and smoking	.....
(iv)	The risk factor leading to about double the number of deaths caused by excessive sodium in food	.....
(v)	The risk factor affecting most a traffic police officer engaged in his duty in the work environment	.....
(vi)	The risk factor directly connected with malnutrition	.....
(vii)	The risk factor directly connected with overnutrition	.....

15

2. (*A*) A sketch of the human urinary system is indicated here.

(i) Write the parts labelled *P*, *Q* and *R* in the diagram in the boxes given opposite to each.

(ii) Of *X* and *Y*, which vessel contains blood with a higher concentration of nitrogenous excretory matter? .....

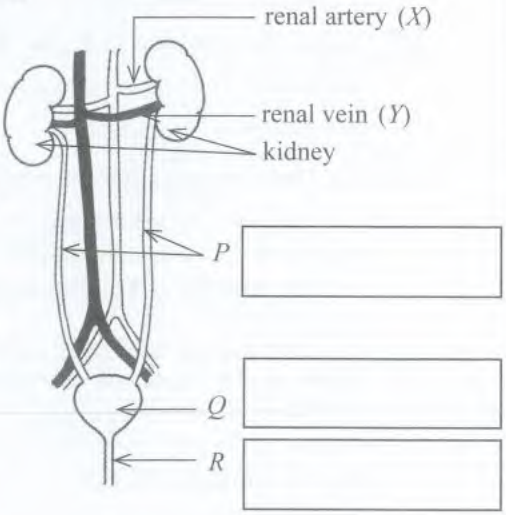
(iii) By what name are the structural and functional units contained in the kidneys known? .....
.....

(iv) Name the **three** stages of the process of urine production taking place in the units you stated in part (iii) above.

(a) .....

(b) .....

(c) .....



[See page three

(*B*) When a fly was coming towards the eye of a student ironing his clothes, his eyes blinked. On the spur of the moment his hand touched the iron. At that very moment his hand was withdrawn from the iron.

(i) By what name are the instant responses mentioned in the above incident commonly known?
.....

(ii) To what type of instant responses does the blinking of eyes when a fly is coming towards the eye belong? .....

(iii) Name the receptor and effector relevant to the instant withdrawal of student's hand from the iron.

(a) Receptor : .....

(b) Effector : .....

(iv) In the following chart, indicate in respective order, the neurones connected with the conduction of the impulse in the event of the hand's withdrawal.



15

3. This question concerns the elements from sodium to chlorine (Na, Mg, Al, Si, P, S, Cl) belonging to the third period of the periodic table.

(*A*) Figures (1) and (2) show graphically how the electronegativity and the first ionization energy vary against the atomic number of Na, Mg and Al of the elements stated above.

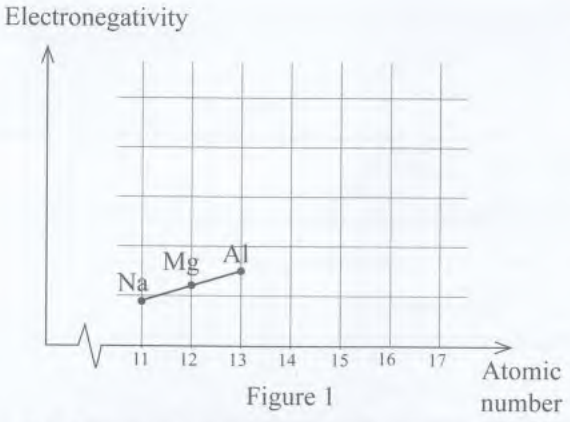


Figure 1

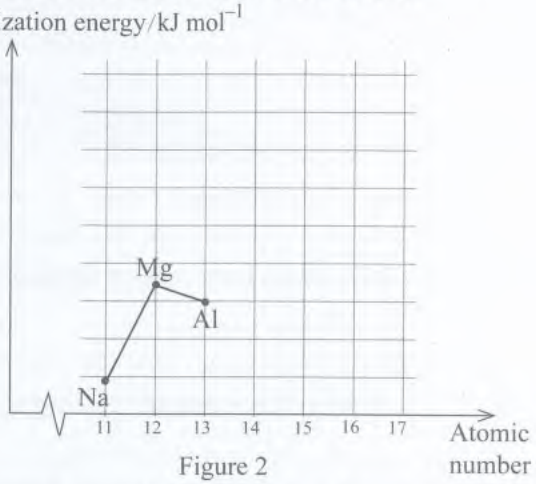


Figure 2

(i) Complete the above **two** graphs indicating approximately the points relevant to the other four elements.

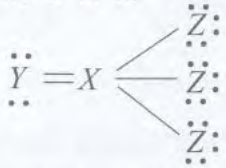
(ii) Of the above seven elements, select the element relevant to each of the following statements and write its symbol.

(a) forms an amphoteric oxide .....

(b) is a metalloid .....

(c) reacts fast with cold water liberating hydrogen .....

(iii) The Lewis structure of the compound $PSCl_3$ formed by the elements P, S and Cl is given below. Write opposite each letter the standard symbols of the elements represented by *X*, *Y* and *Z* in it.



X : .....

Y : .....

Z : .....

(*B*) (i) Complete the blank boxes in the following table relating to the chlorides formed by the elements Na, Mg, Al and Si.

Element	Na	Mg	Al	Si
Formula of the chloride	NaCl	$MgCl_2$	.....	$SiCl_4$
Nature of the bond	ionic	.....	.....	covalent

[*See page four*

(ii) Draw the Lewis structure of $SiCl_4$.

(iii) $SiCl_4$ reacts with water according to the following chemical equation.

$$SiCl_4 + 4H_2O \longrightarrow H_4SiO_4 + 4x$$

(a) Write the chemical formula of the compound indicated by ***x***. .....

(b) Liberation of gas bubbles can be observed when a magnesium ribbon is put into the above reaction mixture. What could be that gas evolved? .....

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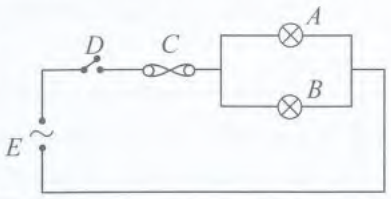
4. (*A*) The figure shows a sub-circuit supplying electricity to two electric lamps *A* and *B* from the distribution box in a domestic electrical circuit.



(i) Name the electrical devices *C* and *D* and state the function carried out by each device in the following table.

Device	Name	Function
C	.....	.....
D	.....	.....

(ii) What is represented by *E*? .....

(iii) When electric lamps *A* and *B* operate in their full power, the current flowing through *C* is 0.42 A. The lamp *A* has been marked 240 V, 60 W.

(a) How much is the current flowing through lamp *A*? .....

.....

(b) How much is the current flowing through lamp *B* ?.....

(c) What is the resistance of lamp *A* ? .....

.....

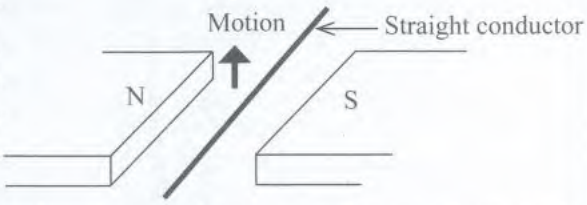
(iv) Though electric lamps should be connected in parallel in a domestic circuit, *A* and *B* were connected in series by a mistake. When that circuit is closed, is the current flowing through *C* is equal to or less than or greater than 0.42 A? .....

(v) In a domestic circuit, an electric stove of power 2 kW was connected to a sub-circuit which can supply a maximum current of 5 A from the distribution box.

(a) What can happen in this instance? .....

(b) Write the cause why it happens ?..... .....

(*B*) (i) A student placed a straight conductor perpendicular to a magnetic field as shown in the diagram and moved it in the direction indicated by the arrow. Mark by an arrow head on the conductor, the direction of the current flowing through the conductor.



(ii) Write the name of the rule used to find the direction of the current flowing through the conductor in part (i) above.

.....

(iii) What is the name of the phenomenon generating the above current?

.....

(iv) Name an instrument which has been produced making use of this phenomenon.

.....

15

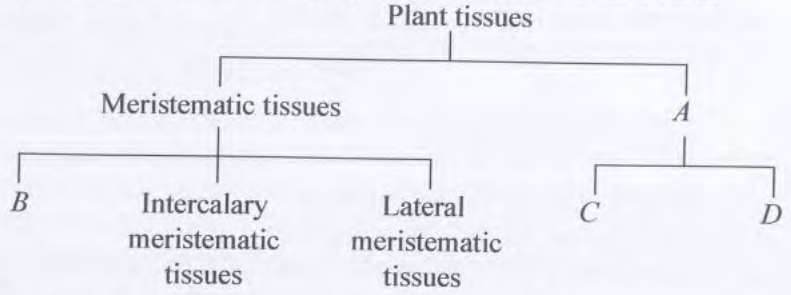
* *

[See page five

Part B

- Answer only **three** questions from the questions No. **5, 6, 7, 8** and **9**.

5. (*A*) A chart regarding the classification of plant tissues is shown below.



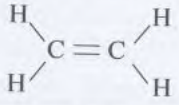
(i) Name the tissue types indicated as *A*, *B*, *C* and *D*.
(ii) In which locations of a plant is the tissue type *B* found?
(iii) Mention the **two** tissues affecting the growth of plant stems in height and girth respectively.
(iv) Name the tissue contributing to the grafting of dicotyledonous plants and state to which type of meristematic tissues it belongs.

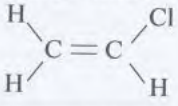
(*B*) A group of students engaged in an educational trip to the national zoological gardens, listed a few external features of some animals they observed as follows.

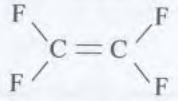
P - streamlined shape of the body
Q - moist and bare skin
R - dry skin with scales all over the body
S - skin covered with hair

(i) Name the common group to which the animals displaying the above features belong.
(ii) Mention the **two** classes to which the animals possessing feature *P* belong.
(iii) Of the features stated above, write the features displayed by toad and crocodile separately.
(iv) Write **two** features common to animals belonging to the classes showing feature *Q* and feature *R*.
(v) Mention **three** other external features common to animals showing feature *S*. (20 marks)

6. (*A*) *P*, *Q* and *R* are three organic compounds which are monomers of three polymers.

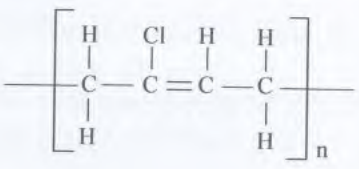

(*P*)


(*Q*)


(*R*)

(i) A widely used polymer polythene is produced by polymerizing *P*.
(a) To which group of hydrocarbons does *P* belong?
(b) The relative molecular mass of a typical polythene molecule is 1 120 000. How many repeating units does a typical polythene molecule contain? (H = 1; C = 12)
(ii) (a) Why are *Q* and *R* not considered hydrocarbons?
(b) Write the name of the polymer formed by the polymerization of *Q*.
(c) The polymer teflon is formed by the polymerization of *R*. Draw in standard form the structure of teflon.

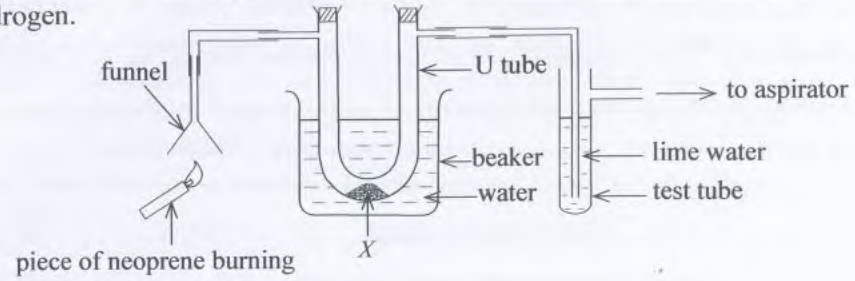
(*B*) The synthetic rubber neoprene with the structure indicated by the figure is produced by the polymerization of the organic compound chloroprene. It has a carbon chain similar to the carbon chain of isoprene, the monomer of natural rubber.



(i) Draw the structural formula of the monomer chloroprene.

[*See page six*

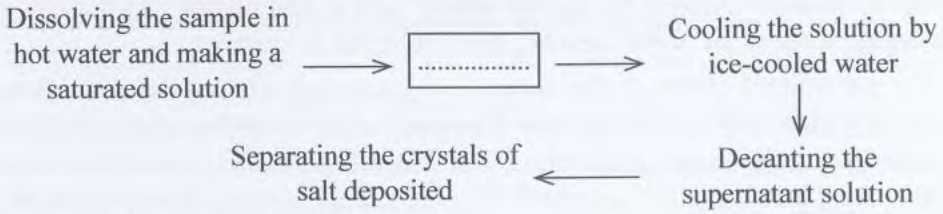
(ii) The figure illustrates a set of apparatus arranged to demonstrate that neoprene contains carbon and hydrogen.



(a) Name *X*.
(b) Mention an error in the set up of apparatus.
(c) What is the function of water in the beaker?
(d) Write **two** observations which you would expect to make when the apparatus is operated after rectifying the error.
(e) Indicate by a balanced chemical equation, the chemical change which causes one of the two observations which you stated in (d) above.

(iii) What is the structural difference at the molecular level resulted in vulcanization of natural rubber?

(*C*) The procedure adopted by a student to obtain purer salt from a sample of unwashed common salt (sodium chloride) bought from the market is as follows.



(i) What is the above procedure called?
(ii) Write the step relevant to the blank.
(iii) Water-soluble magnesium chloride which is present as an impurity in salt is not removed by the procedure described above. Reacting the aqueous solution of salt with a sodium hydroxide solution and filtering off the precipitated, insoluble magnesium hydroxide is a method that can be used to remove magnesium chloride. The incomplete chemical equation for this is given below.

$$MgCl_2(aq) + \text{.....} \longrightarrow \text{.....} + 2NaCl(aq)$$

(a) Complete the above equation and write it in the answer script (Physical states should be indicated.).
(b) Of the four types of reactions you have learnt, to which type does the above reaction belong?
(c) If sodium hydroxide essential for the above reaction is not available in the school laboratory, suggest a method to make a sodium hydroxide solution using common salt.

(20 marks)

7. (*A*) The values of velocity of an object obtained by a student from a displacement - time graph relating to the motion of that object during 4 seconds are indicated in the following table.

time (t) / s	0	1	2	3	4
velocity (v) / m s^{-1}	0	2	4	6	8

(i) Using the data in the table, draw a sketch of the velocity-time graph of the object in your answer script.
(ii) Describe how you estimate the acceleration of the object using the velocity-time graph you have drawn.
(iii) Using the graph, find the displacement of the object at the end of 4 seconds.

(*B*) In order to extinguish a fire broken out in a building, water was gushed into the building very fast with a hose from a water bowser belonging to the urban fire extinguishing unit.
(i) At the time of squirting water from the hose, a fire fighter should put in a great force to hold it in position.
(a) What is the reason for it?
(b) What is the law applicable to explain the above phenomenon?

[*See page seven*

(ii) Within 25 seconds, 100 kg of water were pumped to a floor of the building located at a height of 10 m. What is the power of the water pump?

(iii) Struck by a spurt of water, a washing machine of mass 20 kg in the building moved on the floor with an acceleration of 2 m s^{-2}. How much was the force applied on the washing machine by the spurt of water?

(iv) Under a force of 8 N applied by the water spurt, the washing machine displaced 3 m. If the force remained constant during the entire displacement, how much was the work done on the washing machine?

(*C*) A driver mass 60 kg, drives a motor car on a horizontal road at a constant speed of 36 km h^{-1}.

(i) How much is the energy possessed by the driver by virtue of the motion of the motor car?

(ii) At the foot of a hillock in the road, the driver knocked off the engine and cut off the force provided from it to the car. The car drew forward and stalled after reaching a plateau at the top of the hillock. What is the height of the hillock? (Assume g = 10 m s^{-2})

(*D*) The following table presents various electrical appliances available in a house and information regarding their daily usage.

Appliance	Power/kW	Number of appliances	Number of hours used
Electric lamps	0.06	8	6
Electric irons	0.6	1	1
Electric fans	0.4	5	4
Washing machines	1.2	1	1

(i) How much is the electrical energy spent for electric fans per day?

(ii) How much is the number of electrical units spent during a month of 30 days?

(20 marks)

8. (*A*) (i) What is the hormone which is important in bringing about secondary sexual characteristics of males?

(ii) Why is it important that the pair of testes in the male reproductive system are located in the scrotum outside the body?

(iii) Mention a function carried out by each of the following structures of the male reproductive system.

(a) seminiferous tubules (b) epididymis (c) seminal vesicles

(*B*) (i) Name the locations where the following functions are carried out in the female reproductive system.

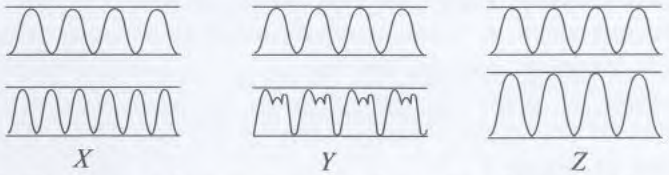
(a) production of ova (b) fertilization (c) implantation

(ii) Mention briefly and separately the changes taking place in the wall of the uterus during the following two main phases of the menstrual cycle.

(a) menstrual phase (b) proliferation phase

(*C*) The characteristics that help distinguish sounds from one another are called characteristics of sound.

(i) Name separately the **three** characteristics of sound illustrated by the pairs of wave patterns labelled *X*, *Y* and *Z*.



X *Y* *Z*

(ii) Of *X*, *Y* and *Z* above, select and write the pair of graphs that can be used to explain each of the following differences.

(a) the difference felt when you have a face to face discussion with a friend of yours and his voice is heard from a loudspeaker

(b) the difference felt when a same note is played by the same musical instrument at medium and high pitch

(iii) Write a factor on which the frequency of the sound produced by a violin depends.

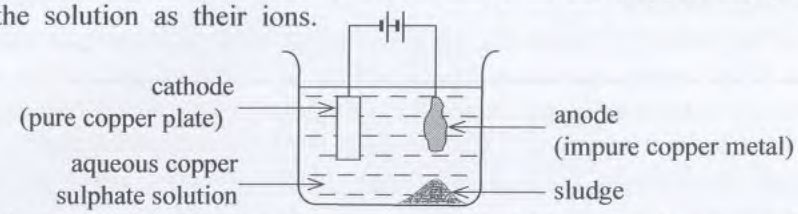
(iv) Mention **two** characteristics of ultrasound waves.

(v) Ultrasound waves are used to investigate the location of a tumour (a part with abnormal growth) inside the body. In such a test, the velocity of the wave inside the tumour was 1.7 km s^{-1}. What is the wave length of the wave inside the tumour? The operation frequency of the scanning machine is 4 MHz (1 MHz = 10^6 Hz).

(20 marks)

[*See page eight*

9. (*A*) In extraction of copper metal, the impure metal obtained by roasting copper ores is purified by an electrolytic method known as electrorefining. In this process, an electrolytic cell with impure copper as the anode and a pure plate of copper as the cathode is used as shown in the diagram and the copper ions entering into the solution from the anode get deposited on the cathode (as in electroplating of iron with copper). Impurities in the impure metal fall to the bottom of the container as sludge and it contains traces of valuable metals such as gold and silver. Metals such as iron and zinc contained in the impure metal are not deposited but pass into the solution as their ions.



(i) Write half reactions occurring at the anode and the cathode separately in respective order.

(ii) During electrolysis, what can be observed with regard to the intensity of the colour of the copper sulphate solution with the passage of time?

(iii) Based on the position occupied by the respective metals in the activity series, briefly explain the reasons for the following phenomena.
(a) Metals such as iron and zinc enter the solution in the form of ions without being deposited.
(b) Gold and silver exist as native (free) metals in the sludge.

(iv) Name a suitable method to separate gold and silver from other impurities of the sludge. (Gold and silver are high-density metals.)

(v) The purity of copper obtained by the above method is 99.95% by mass. How many copper atoms are there in 100 g of pure copper so obtained? The final answer is **not** required and indicating how the calculation is done is adequate. (Cu = 63.5, Avagardo Constant = 6.022×10^{23} mol^{-1})

(vi) What is the reason why relative atomic mass of copper assumes a fractional value such as 63.5?

(vii) In electrical conductivity, copper comes next to silver only. State one use of copper that exploits this property.

(viii) The following equation indicates a chemical reaction taking place when copper ores are roasted.

$$2Cu_2S + 3O_2 \longrightarrow 2Cu_2O + 2SO_2$$

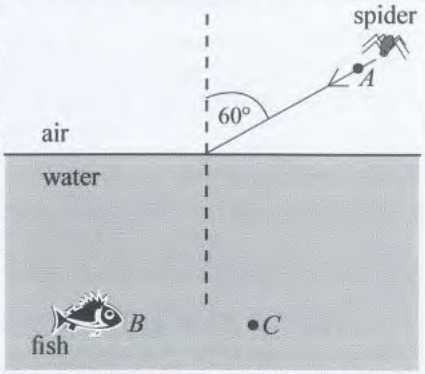
Mention an environmental problem caused by the gaseous product of the above reaction.

(*B*) The figure shows a spider at point *A* in the air above the water surface and a fish in a pond at point *B*. The angle of incidence of the rays coming from the spider to the fish is 60° and the angle of refraction is 40°.

(i) Calculate the refractive index of water relative to air. (Assume Sin 60° = 0.8 and Sin 40° = 0.6)

(ii) (a) Indicating the position of the spider and the fish as *A* and *B* respectively, illustrate by a rough ray diagram the path of the ray from *A* to *B*.
(b) On the perpendicular drawn to the water surface passing through point *A*, mark as *D*, the position of the spider's image as seen by the fish.

(iii) If the fish swims in water towards a point *C*, how will the location of the spider's image seen by the fish relative to point *D* change?



(*C*) A water-filled, open metal container with 1 m^2 area of cross section and a black-coated outer surface is kept outdoor exposed to sunlight. After 4 hours it was observed that its water level has dropped by 5 cm.

(i) Mention the method of heat transfer relevant to each of the following instances.
(a) transfer of heat to the outer surface of the container
(b) transfer of heat from the outer surface to the inner surface of the container

(ii) What is the reason for the drop of the water level in the container?

(iii) If the outer surface of the container is white-coated, how will the drop of the water level differ relative to the drop when it is black-coated after 4 hours? Mention the reason for your answer.

(20 marks)

* * *