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Third Term Test - 2025

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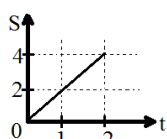
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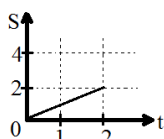
Grade 11**SCIENCE - I****01 Hour****Name / Index No. :****IMPORTANT :**

- Answer all questions.
 - Choose the correct or most appropriate answer from the answers given in question 1 to 40.
- $(g = 10 \text{ m s}^{-2})$

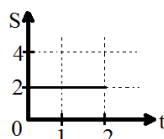
- Among the following plants, the non-flowering plant that produces seeds is:
 (1) Cycas. (2) Marchantia. (3) Selaginella. (4) Salvinia.
- What is the molar mass of Urea, $\text{CO}(\text{NH}_2)_2$? ($\text{N}=14, \text{O}=16, \text{H}=1, \text{C}=12$)
 (1) 43 g mol^{-1} (2) 44 g mol^{-1} (3) 60 g mol^{-1} (4) 86 g mol^{-1}
- Which of the following phenomena can be explained using Newton's Third Law?
 (1) A carrom disc travels a greater distance when powder is applied.
 (2) Passengers being thrown forward when a moving bus suddenly stops.
 (3) Placing a box stationary on a table and then moving it again.
 (4) A lit skyrocket travels upwards.
- Which human genetic disorder is expressed only in males?
 (1) Thalassaemia. (2) Hemophilia. (3) Red-green colour blindness. (4) Albinism.
- Which pair of metals does not react with cold water or hot water, but reacts with steam?
 (1) Iron and Zinc. (2) Iron and Copper (3) Tin and Aluminum (4) Tin and Magnesium
- The resultant of two collinear forces is 2 N. What could be the magnitude of the force pair?
 (1) 2 N and 1 N. (2) 2 N and 2 N. (3) 2 N and 4 N. (4) 2 N and 6 N.
- Which displacement-time graph represents an object moving at a velocity of 2 m s^{-1} ?



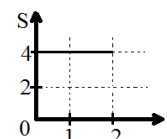
(1)



(2)



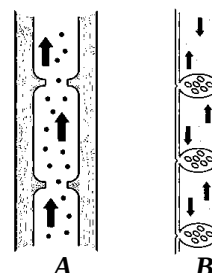
(3)



(4)

- The figure illustrates substance transport in two permanent plant tissues. Accordingly,

	A	B
(1)	Phloem tissue	Xylem tissue
(2)	Sclerenchyma tissue	Parenchyma tissue
(3)	Xylem tissue	Phloem tissue
(4)	Parenchyma tissue	Sclerenchyma tissue

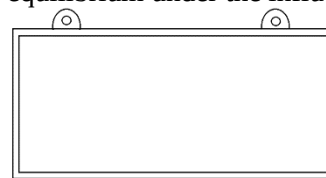


- Which answer shows the pair of covalent compounds with a double bond and a triple bond, respectively?
 (1) O_2 and CO_2 (2) CO_2 and N_2 (3) O_2 and NH_3 (4) H_2O and N_2
- Which is a type of biomolecule that contributes to the formation of living matter?
 (1) Amino acid. (2) Minerals. (3) Water. (4) Nucleic acid.
- In the process of producing salt from seawater, the salts precipitated in the first and second tanks, respectively, are:
 (1) Calcium sulphate and Sodium chloride.
 (2) Calcium carbonate and Calcium sulphate.
 (3) Magnesium sulphate and Magnesium chloride.
 (4) Calcium carbonate and Magnesium chloride.



12. The figure shows a whiteboard suspended by two nails. The whiteboard is in equilibrium under the influence of:

- (1) Two collinear forces.
- (2) Two parallel forces.
- (3) Three parallel forces.
- (4) Three non-parallel forces.



13. Three examples of situations where hydrostatic pressure is involved are given below:

A - Mercury barometer. **B** - Vehicle braking systems. **C** - Hydraulic jack.

Among them, pressure transmission is used in:

- (1) Only **A** and **B**.
- (2) Only **A** and **C**.
- (3) Only **B** and **C**.
- (4) All **A**, **B**, and **C**.

14. An ammonium salt of a certain ion **X** is NH_4X . What could be the formula formed by sodium with **X**?

- (1) Na_4X
- (2) NaX_4
- (3) Na_4X_2
- (4) NaX

15. When the mosaic leaf shown in the figure is subjected to the starch test:

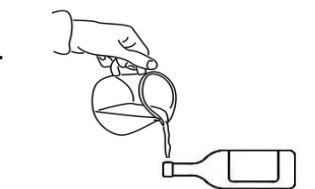
- (1) Both areas **X** and **Y** turn dark violet or blue.
- (2) Only area **X** turns dark violet or blue.
- (3) Only area **Y** turns dark violet or blue.
- (4) No colour change occurs in any part of the leaf.



16. Statement: A tightly stuck metal cap of a glass bottle can be easily loosened by pouring hot water onto the cap.

Reason: When hot water is added, the glass of the bottle contracts and the cap loosens.

- (1) Both the statement and the reason are true.
- (2) The statement is true, but the reason is false.
- (3) The statement is false, but the reason is true.
- (4) Both the statement and the reason are false.



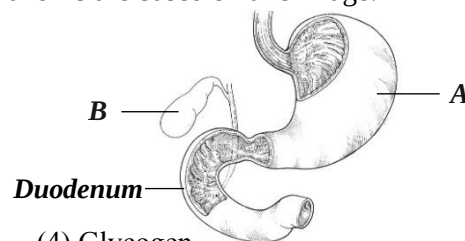
- A part of the human digestive system is shown in the image. Questions 17 and 18 are based on this image.

17. A function of the organ represented by **A** in the figure is:

- (1) Subjecting food to mechanical digestion.
- (2) Carrying out chemical digestion in an alkaline medium.
- (3) Carrying out the absorption of final products of digestion.
- (4) Secreting the enzyme Trypsin.

18. The substance produced in the liver and stored in **B** is:

- (1) Urea.
- (2) Bile.
- (3) Pepsin.
- (4) Glycogen.



19. The relative atomic mass of an atom of an element belonging to the first 20 elements is 12 times the $\frac{1}{12}$ of the mass of a $^{12}_6\text{C}$ isotope atom. What is that value?

- (1) $\frac{1}{12}$
- (2) 1
- (3) 12
- (4) 144

20. A transformer provides an output of 2200 V when a potential difference of 220 V is applied. If the primary coil has 100 turns, what is the number of turns in the secondary coil?

- (1) 10
- (2) 100
- (3) 1000
- (4) 10000

21. Which is the correct relationship between the cell organelle given below and the function it performs?

- (1) Mitochondria - Protein synthesis.
- (2) Cell wall - Carrying out various metabolic activities.
- (3) Vacuole - Producing and packaging secretory materials.
- (4) Nucleus - Controlling the life activities of the cell.

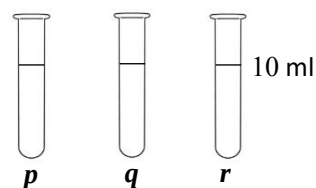
22. Consider the statements regarding the change in concentration when three samples of an acid solution with a concentration of 0.1 mol dm^{-3} , taken as 2.5 ml, 5.00 ml, and 7.5 ml respectively, are placed in three test tubes **p**, **q**, and **r** and water is added up to 10 ml.

A - The concentration has gradually decreased.

B - The concentrations in all three tubes are equal.

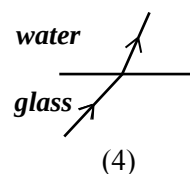
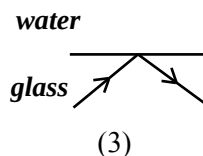
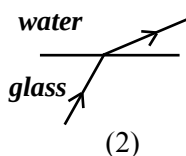
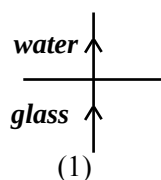
C - The concentration in every tube is less than 0.1 mol dm^{-3} .

Which of these is correct?



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

23. Which situation cannot be the path of a light ray travelling from a glass block to water?



24. The following shows three types of electromagnetic waves:

A - Radio waves **B** - Microwaves **C** - Infrared radiation

Which of these are used for communication purposes?

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

25. Which statement regarding viruses is **false**?

- (1) Viruses contain DNA or RNA. (2) They multiply only inside living cells.
(3) They show metabolic reactions. (4) They exhibit both living and non-living characteristics.

26. Consider the following statements regarding the industrial production of sodium by the electrolysis of molten sodium chloride.

Statement: The anode and cathode are separated by a steel mesh diaphragm.

Reason: To prevent the reaction between sodium and chlorine to reform sodium chloride.

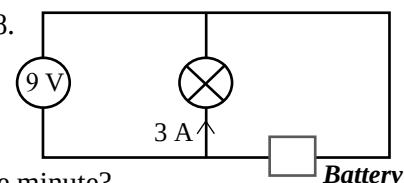
Which statement regarding the Statement and Reason is correct?

- (1) Both the Statement and the Reason are true. (2) Both the Statement and the Reason are false.
(3) The Statement is true and the Reason is false. (4) The Statement is false and the Reason is true.

- Consider the following circuit diagram for answering the questions 27 and 28.

27. What is the resistance of the bulb?

- (1) $\frac{1}{3} \Omega$ (2) 3Ω
(3) 6Ω (4) 27Ω



28. What is the amount of electrical energy consumed when the bulb is lit for one minute?

- (1) 20 J (2) 180 J (3) 360 J (4) 1620 J

29. Consider the following statements regarding bud grafting:

A - Grafting can only be done on plants that have cambium tissue.

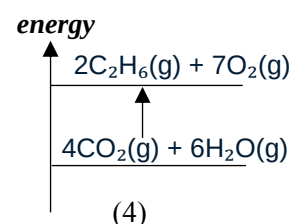
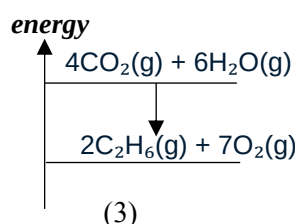
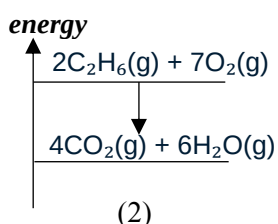
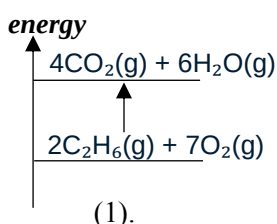
B - It can be used to propagate even plants that produce seeds well.

C - The grafted area should be wrapped with polythene strips from top to bottom.

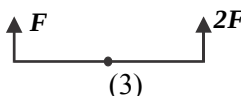
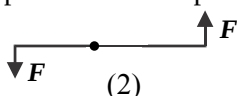
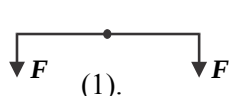
Which of these are correct?

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

30. Which is the correct energy level diagram representing the complete combustion of ethane gas?



31. Which of these situations represents the couple of forces?



32. Which answer correctly shows a method by which sulphur dioxide (SO_2) and oxides of nitrogen (NO_x) are released into the atmosphere, respectively?

	Sulfur Dioxide	Oxides of Nitrogen
(1)	Volcanic eruption	Lightning
(2)	Lightning	Exhaust from untuned engines
(3)	Burning of vulcanized rubber	Volcanic eruption
(4)	Exhaust from untuned engines	Burning of vulcanized rubber

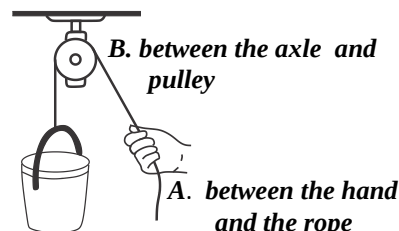
33. The main function of the human kidneys is:

- (1) To regulate the blood glucose level. (2) To prepare the body for an emergency.
(3) To filter nitrogenous waste products from the blood. (4) To regulate the body temperature.

34. The figure shows two locations where friction acts when drawing water from a well.

Are the frictional forces **A** and **B** useful for drawing water?

	A	B
(1)	Useful	Useful
(2)	Not Useful	Useful
(3)	Useful	Not Useful
(4)	Not Useful	Not Useful



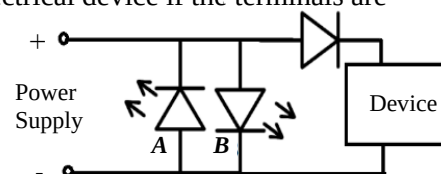
35. Consider the following statements regarding the techniques used to separate components based on the nature of mixtures.

	Nature of the Mixture	Separation Technique
A	Volatile and non-volatile components	Simple distillation
B	Volatile components	Fractional distillation
C	Non-volatile components	Chromatography

Which of these are correct?

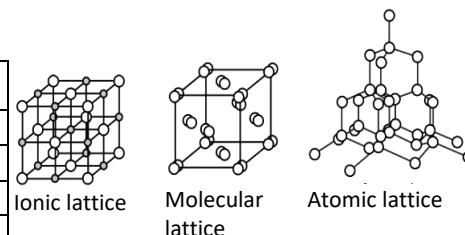
- (1) **A** and **B** only. (2) **A** and **C** only. (3) **B** and **C** only. (4) All **A**, **B** and **C**.
36. The figure shows a circuit used to prevent damage to a battery-powered electrical device if the terminals are reversed. If the terminals are reversed when supplying power:

- (1) LED **A** lights up and the device operates.
 (2) LED **B** lights up and the device operates.
 (3) LED **A** lights up and the device does not operate.
 (4) LED **B** lights up and the device does not operate.

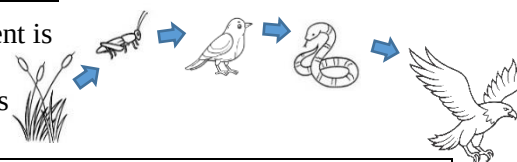


37. Which answer correctly matches the type of lattice structure shown in the diagrams with the corresponding element or compound?

	Ionic Lattice	Molecular Lattice	Atomic Lattice
(1)	Sodium Chloride	Water	Diamond
(2)	Diamond	Graphite	Water
(3)	Sodium Chloride	Water	Graphite
(4)	Diamond	Sodium Chloride	Water



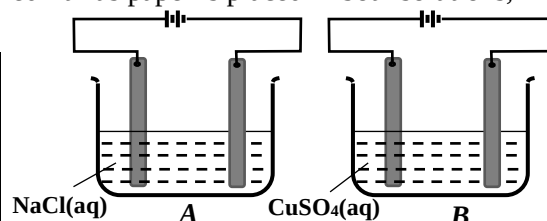
38. A linear representation of a food chain is shown here. Which statement is correct regarding the concentration of non-degradable chemical substances and the amount of energy produced by a unit mass of grass and stored in the bodies of the grasshopper and the hawk?



	Amount of Stored Energy	Concentration of Non-degradable Chemical Substances
(1)	Maximum in the Hawk	Minimum in the Grasshopper
(2)	Maximum in the Grasshopper	Minimum in the Hawk
(3)	Maximum in the Grasshopper	Maximum in the Hawk
(4)	Minimum in the Hawk	Minimum in the Hawk

39. The figure shows two setups, **A** and **B**, for the electrolysis of aqueous sodium chloride solution NaCl(aq) and aqueous copper sulphate solution $\text{CuSO}_4\text{(aq)}$. When a piece of red litmus paper is placed in both solutions, which option correctly shows the colour change that occurs?

	A	B
(1)	No change (Red)	Blue
(2)	Blue	No change (Red)
(3)	No change (Red)	No change (Red)
(4)	Blue	Blue



40. Which is the most practical step that can be taken to protect passengers, including schoolchildren?
- (1) Removing buses with various decorations, unnecessary light patterns, and loud music from service.
 (2) Constructing advanced safety barriers according to international standards near winding spots in hilly areas.
 (3) Limiting the import of vehicles, as the number of accidents increases proportionally when the number of vehicles in the country is high.
 (4) Prohibiting the operation of heavy vehicles such as container trucks and tipper trucks during morning and afternoon hours, as they cause both traffic congestion and severe road accident.



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 Third Term Test - 2025

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II

Grade 11

SCIENCE - II

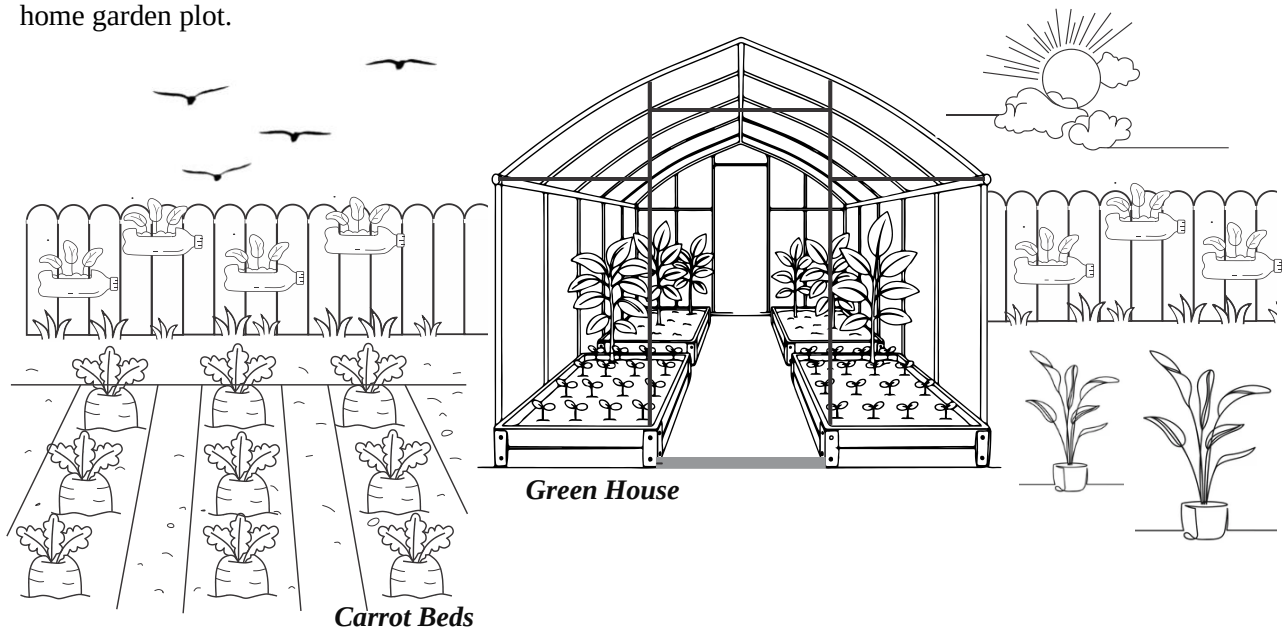
03 Hours

Name / Index No. :

Important : This question paper consists of two parts, **A and B**.
 Answer **all** questions in **Part A** within the space provided.
 Answer **only three** questions in **Part B**.

A-Structured Essay

1. (A) The figure shows a greenhouse used for cultivating several types of crops, along with an associated organic home garden plot.

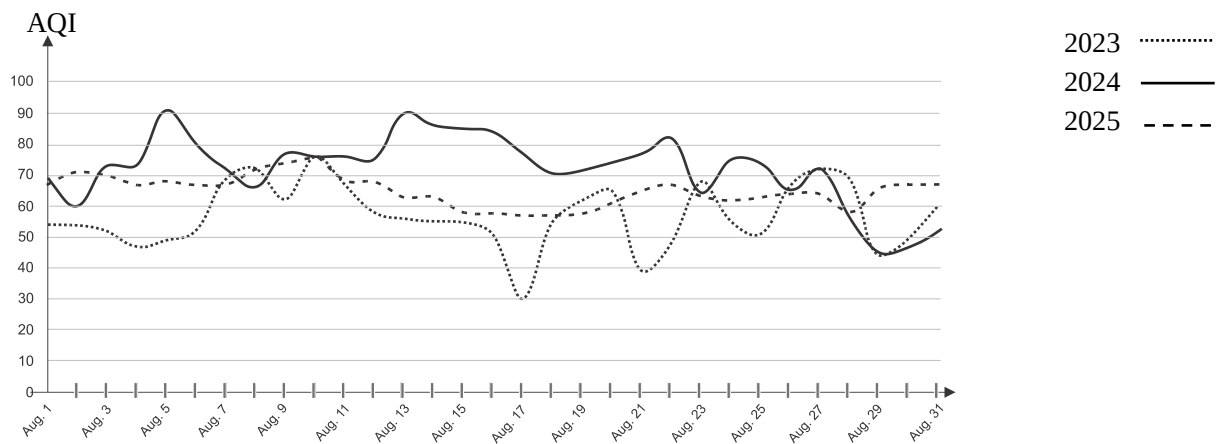


- (i) The residents hope to grow cabbage in addition to carrots in the same bed where they have grown carrots.
- (a) What is the sustainable agricultural practice of growing cabbage in the same bed with carrots? (01)
-
- (b) Write a specific benefit that can be obtained from the sustainable agricultural practice you mentioned. (01)
-
- (ii) Some crops are planted in plastic bottles and disposable polythene bags.
- (a) What methodology has been followed there according to the 4R concept of waste management? (01)
-
- (b) Suggest an environmentally friendly method that can be practiced instead of burning polythene and plastic that are discarded and unusable in agricultural fields. (01)
-
- (iii) Write a benefit that soil organisms gain by practicing organic farming. (01)
-
- (iv) The process of reflecting thermal radiation that occurs in a greenhouse also takes place in the atmosphere and is called the "greenhouse effect."
- (a) Write a beneficial effect of the greenhouse effect. (01)
-
- (b) Name a gas that is used to increase the temperature in greenhouses in some countries. (01)
-



- (c) Name an environmental problem that has arisen due to the high concentration of the gas you mentioned in (b) above..... (01)
- (v) Write a direct effect of environmental pollution that affects photosynthesis and reduce crop yield.
..... (01)
- (vi) Maintaining a garden, even on a small scale, contributes to reducing food mile.
(a) What is food mile ? (01)
..... (01)
(b) How does reducing food mile helps to reduce global warming?
..... (01)
.....

(B) Below is a graph showing the variation in air quality in a major city in Sri Lanka during the months of August for the past three years, quoted from the Air Quality Index (AQI), which is a constantly updated source of information on air pollution in various parts of the world.

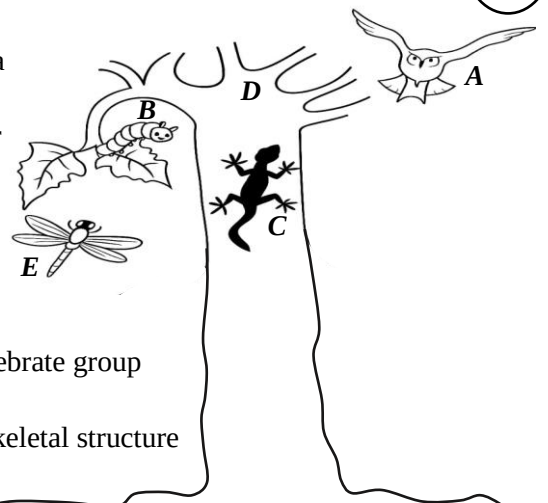


- (i) In which year was the AQI value at its lowest level throughout the month of August?
..... (01)
- (ii) Air quality is considered good when the AQI value is below 50.
(a) What was the year in which the atmospheric conditions were not good on any day in August?
..... (01)
(b) The period in 2024 during which the air quality was favorable is from the date of to the date of (01)
- (iii) Name a health problem that can be caused due to the excessive air pollution.
..... (01)

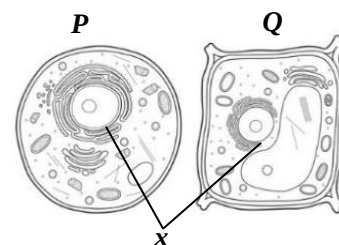
2. (A) The diagram below shows a terrestrial ecosystem.

15

- (i) Is the plant shown in the figure a monocotyledonous plant or a dicotyledonous plant (01)
- (ii) Write a feature shown in the diagram that confirms the answer in (i) above.. (01)
- (iii) State the modes of nutrition of organisms A and D separately, as autotrophic or heterotrophic (02)
A -
D -
- (iv) State the letters representing the animals belonging to the vertebrate group shown in the figure. (02)
- (v) What is the letter representing the organism that possesses a skeletal structure with hollow internal bones?
..... (01)



(B) **P** and **Q** in the figure represent two types of living cells.



(i) Write two structural differences that can be seen in these two cells. (02)

.....

(ii) Here, 'x' represents an organelle. State its main function.

.....(01)

(iii) If **Q** is a gamete cell consisting of eight chromosomes, what is the number of chromosomes in its mother cell?(01)

(C). An incomplete Punnett square presented by a student regarding Thalassemia disease is shown below.

Complete the blanks (a), (b), (c) and (d) in the Punnett square.

T - Dominant healthy gene
t - Recessive gene

(02)

(i) The student states that Thalassemia is a disease caused by a "mutation of sex-linked genes".

(a) Do you agree with this statement?

..... (01)

(b) What is the reason for your answer?

(01)

father mother	(a)	(b)
(c)	TT	Tt
t	Tt	(d)

3.(A) An incomplete diagram of the Periodic Table displayed in a school laboratory is shown in the figure.

15

PERIODIC TABLE OF ELEMENTS

PERIODIC TABLE OF ELEMENTS																		2																																	
1																	2																																		
H																	He																																		
Hydrogen																		Helium																																	
3	4															5	6	7	8	9	10																														
Li	Be															B	C	N	O	F	Ne																														
Lithium																		Boron		Nitrogen		Oxygen		Fluorine		Neon																									
11	12															13	14	15	16	17	18																														
Na	Mg															Al	Si	P	S	Cl	Ar																														
Sodium																		Aluminum		Silicon		Phosphorus		Sulfur		Argon																									
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36																																		
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr																																		
Potassium																		Calcium		Scandium		Titanium		Vanadium		Chromium		Manganese		Iron		Cobalt		Nickel		Copper		Zinc		Gallium		Germanium		Arsenic		Selenium		Bromine		Krypton	
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54																																		
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe																																		
Rubidium																		Strontium		Yttrium		Zirconium		Niobium		Molybdenum		Technetium		Ruthenium		Rhodium		Palladium		Silver		Cadmium		Indium		Tin		Antimony		Tellurium		Iodine		Xenon	
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86																																		
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At																																			
Cesium																		Barium		Lanthanum		Hafnium		Tantalum		Tungsten		Rhenium		Osmium		Iridium		Platinum		Gold		Mercury		Thallium		Lead		Bismuth		Polonium		Astatine		Radon	
87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118																																		
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Og																																			
Francium																		Radium		Actinium		Rutherfordium		Dubnium		Seaborgium		Bohrium		Hassium		Meitnerium		Darmstadtium		Roentgenium		Copernicium		Nihonium		Flerovium		Moscovium		Livermorium		Tennessine		Oganesson	

(i) Write the group number corresponding to the first 20 elements above their respective groups. (02)

(ii) Select and write one element from the table that is used for each of the industries given below.

(a) Production of Magnalium alloy used for aircraft fuselage - (01)

.....

(b) Vulcanization of rubber - (01)

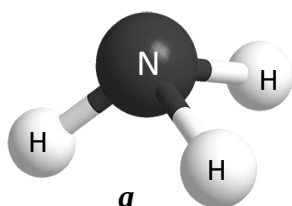
.....

(c) Production of glass that can be heated to high temperatures -. (01)

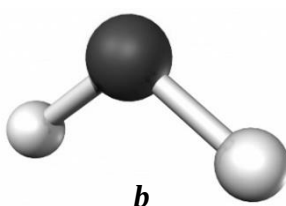
(iii) Arrange the metals with atomic numbers 78, 79, and 80 from the Periodic Table in order of their position in the reactivity series. (03)

(iv) Darken the two elements in the table above that belong to the first 20 elements, are gaseous at room temperature, and are **not** Noble gases. (02)

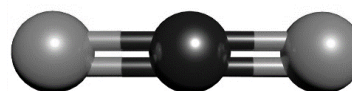
(B) Three 3D models (**a**, **b**, and **c**) prepared by a student for a science exhibition using molecular model kits are shown in the figures.



a



b



c

(i) Which of **a**, **b**, and **c** is the molecule with a **double** bond? (01)

.....

(ii) If the molecule '**b**' presented by the student consists of Hydrogen and Oxygen atoms, draw its Lewis structure in the given box.

(02)

- (iii) Write which molecular model has the highest polarity. (01)
- (iv) Which molecular model has only one lone pair of electrons (01)
4. (A) A setup used to identify the factors affecting momentum is shown in the figure. The setup is arranged so that the metal wheel can move along the rail at a uniform velocity when pushed.



- (i) In the first instance, a metal wheel with a mass of 1 kg moved at a uniform velocity of 1 m s^{-1} and travelled a distance ' d ' into the clay block before stopping. If the following changes are made to the setup and the activity is performed again, state whether the distance travelled will be **greater** than , **less** than , or **equal** to the distance d . (02).

Instance	Change made	Distance travelled relative to the first instance
Second	Moving the metal wheel with a mass of 1 kg at a uniform velocity of 2 m s^{-1}	
Third	Moving a metal wheel of equal size but with a mass of 2 kg at a uniform velocity of 1 m s^{-1}	

- (ii) State the factor affecting momentum that was examined by the following comparisons. (02)
- First and Second Instances :
 - Second and Third Instances :
- (iii) If the momentum of the wheel is p , the mass is m , and the velocity is v , write an expression for momentum using p , m , and v (01)
- (iv) What is the Newton's law that can explain the motion of the metal wheel along the rail at a uniform velocity (01)
- (v) In the first instance, an unbalanced force of 2 N was required to start the wheel's motion. What is the initial acceleration of the wheel?
..... (01)
- (vi) In this activity, when the factors are changed in the second and third instances, the frictional force between the rail and the wheel also changes, in addition to the momentum. What factor affecting friction is responsible for this? (01)

(B) The figure below shows a diagram of an electrically operated crane. The crane has lifted a box with a mass of 50 kg upwards. $g = 10 \text{ m s}^{-2}$

- (i) What is the moment of force when the arm X of the crane is just starting to lift? (Assume the weight of the arm is negligible.) (02)

.....

- (ii) When the box is lifted above the ground level, the stored potential energy is 2000 J. -

- (a) At that moment, what is the height of the box from the ground level?

..... (01)

- (b) If there is no energy loss, what is the amount of electrical energy consumed for lifting?

..... (01)

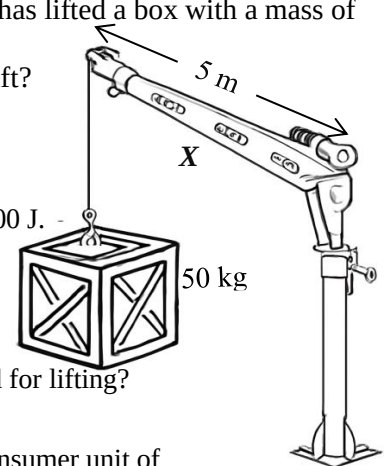
- (iii) This crane has been directly supplied with electricity from the isolator in the consumer unit of the factory. This can be harmful to both the crane and the operator.

- (a) What could be the reason for it being so harmful (01)

- (b) Name a component in the consumer unit to ensure the safety of the equipment and the operator. (02)

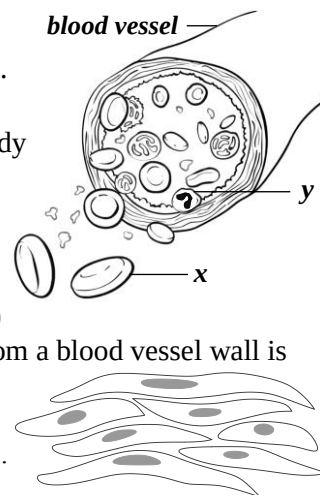
For the safety of the crane -

For the safety of the operator -



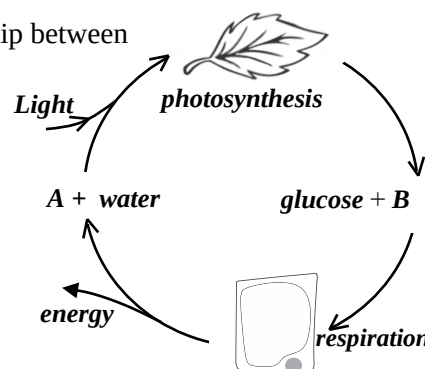
5. (A) The figure shows a blood vessel with several types of cells found in human blood.

- To which of the four main types of animal tissues that constitute the human body does blood belong? (01)
- Write a unique characteristic of the tissue to which human blood belongs. (01)
- State a function performed by the blood tissue for the human body. (01)
- State the two cell types, *x* and *y*, shown in the figure, in order. (02)
- Which of the cell types, *x* or *y*, is enucleated (lacks a nucleus)? (01)
- A line diagram of a microscopic representation of a small tissue piece taken from a blood vessel wall is shown here. (03)
 - What is the name of the muscle tissue that makes up the blood vessel wall?
 - Name another location in the human body where this muscle tissue is found.
 - Write a characteristic unique to this muscle tissue.



(B) The figure shows a diagram drawn by a student to illustrate the relationship between photosynthesis and respiration.

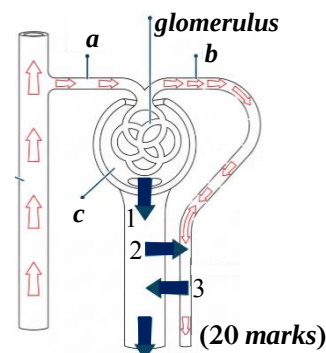
- A* and *B* in the figure represent two compounds. State these two compounds in order. (02)
- What is the factor not mentioned in the figure that contributes to the process of photosynthesis? (01)
- State a product (not shown in the figure) formed during respiration when *B* is absent. (01)
- Write the balanced chemical equation for aerobic respiration. (02)



(C) The kidney is the main organ for nitrogenous excretion in humans.

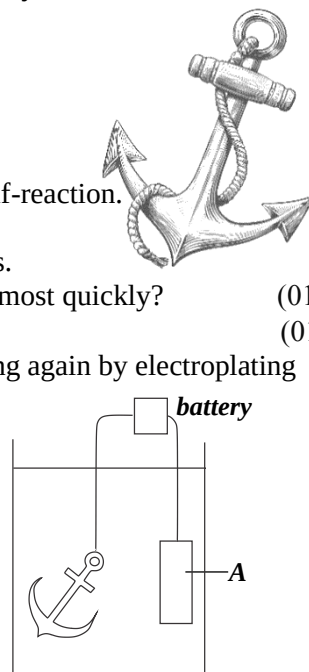
The structural and functional unit of the kidney is the nephron. Steps 1, 2, and 3 in the figure indicate the three steps in urine production within a nephron.

- For step 1 to occur, the blood pressure in the glomerulus must be high. What is the adaptation for this? (01)
- State a substance that is not filtered in step 1 in a healthy person. (01)
- State a substance that is completely reabsorbed into the blood capillaries in step 2, which involves the expenditure of energy, in a healthy person. (01)
- Explain simply why drinking adequate water is necessary for the healthy maintenance of the kidneys and the urinary bladder. (02)



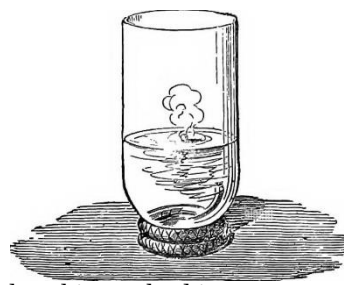
6. (A) An iron anchor used to keep ships moored in the sea is shown here, and it is heavily rusted.

- Write the two essential factors affecting for rusting of iron. (02)
- A student states that contact with seawater accelerates rusting.
 - Do you agree with this? (01)
 - What is the reason for your answer? (01)
- In the process of rusting, iron undergoes oxidation. Write the corresponding half-reaction. (02)
- Various chemicals are used to remove rust from steel objects, including anchors.
 - What is the strong acid that can be used to remove the rust from the anchor most quickly? (01)
 - Why should one be more careful when handling strong acids? (01)
- An arrangement is planned as below to protect the de-rusted anchor from rusting again by electroplating it with Zinc.
 - What element should be used for electrode *A* here? (01)
 - If Copper were to be plated instead of Zinc, write two changes that should be made to the setup. (01)
 - How does plating with Zinc provide better protection to iron than plating with Copper? (01)



(B) The teacher dropped a small piece of sodium into a bowl of distilled water, and it reacted vigorously.

- (i) One observation obtained here was the heating of the bowl.
 - (a) What could be the reason for the heating of the bowl? (01)
 - (b) Write another observation from the reaction. (01)
- (ii) If a drop of phenolphthalein was added to the distilled water before adding the sodium piece:
 - (a) What is the color change observed when the reaction occurs? (01)
 - (b) What is the reason for the color change? (01)
- (iii) Hydrogen gas is liberated as a product of the reaction, but the teacher said that this method is not suitable for producing hydrogen.
 - (a) What could be the reason for that? (01)
 - (b) Name an element and a compound that can be used to produce hydrogen gas in the laboratory. (02)
- (iv) Both the downward displacement of air and the downward displacement of water can be used to collect the hydrogen gas produced in the laboratory. Which method do you suggest as the most suitable? Explain the reason simply. (02)

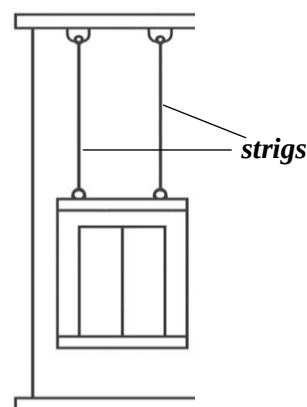


(20 marks)

7. **(A)** The figure shows a schematic arrangement of an electric elevator used to travel from the ground floor to an upper floor. The table shows how the velocity changed during the motion of the elevator.

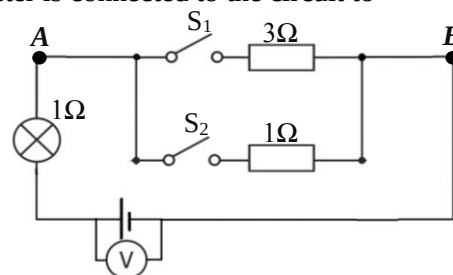
Time (s)	0	1	2	3	4	5	6	7	8	9	10
Velocity (m s^{-1})	0	1	2	3	3	3	3	3	2	1	0

- (i) Draw the velocity-time graph for the motion of the elevator. (02)
- (ii) Calculate the height traveled by the elevator using the graph. (02)
- (iii) What is the time duration for which the elevator traveled at a uniform velocity (02)
- (iv) At 10 s:
 - (a) Draw a sketch showing all the external forces acting on the elevator. (02)
 - (b) If the weight of the elevator is 1000 N, what is the tension in a single cable? (02)



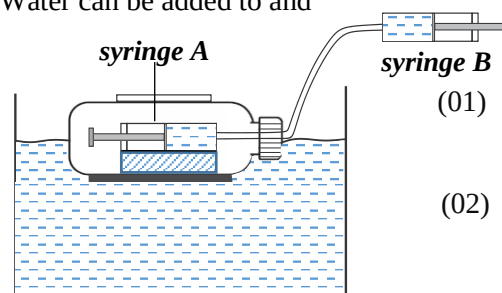
(B) The figure shows the circuit diagram of a flashlight created by a student. The bulb's brightness can be increased or decreased using switches S_1 and S_2 . A small digital voltmeter is connected to the circuit to measure the charge state of the electric cell.

- (i) When switch S_1 is closed, does the current flow from **A** to **B** or from **B** to **A**? (01)
- (ii) State separately whether switches S_1 and S_2 should be closed/open in the following situations:
 - (a) To measure the electromotive force (EMF) of the cell using the voltmeter. (01)
 - (b) To obtain the minimum brightness of the bulb. (01)
- (iii) Assuming the resistance of the connecting wires and switches is zero, calculate the equivalent resistance of the resistors, including the bulb, when switches S_1 and S_2 are closed. (02)



(C) The figure shows a model of a submarine created for an exhibition. Water can be added to and removed from syringe **A** using syringe **B**.

- (i) Should the piston of syringe **B** be pushed forward or pulled out to send the submarine to the bottom of the water container? (01)
- (ii) Write the relationship between the upthrust (U) exerted by the water on the submarine and the weight (W) of the submarine in the following situations: (02)
 - (a) Before the submarine sinks in the water.
 - (b) When the submarine is sinking in the water.



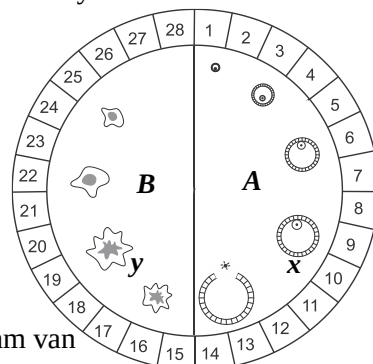
- (iii) If the submarine is submerged in water at a depth of 0.5 m, what is the pressure exerted by the column of water above a point on it? (Density of water 1000 kg m^{-3} , $g = 10 \text{ m s}^{-2}$) (02)

(20 marks)

8. (A) Aquatic organisms survive in water even during the winter.
- State two special properties of water contributing to maintenance of life. (02)
 - The metabolic activity of fish decreases during winter.
 - What is the name of the organic catalysts that increase the rate of the biochemical reactions responsible for this? (01)
 - What is the group of biomolecules to which these catalysts belong? (01)
 - Write two elements belonging to that group of biomolecules. (01)

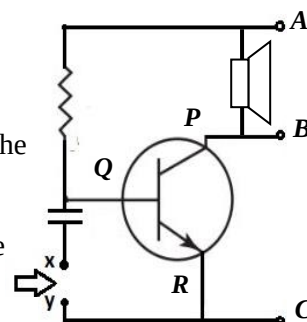
(B) The figure shows a schematic diagram illustrating the changes that occur in the ovary during the menstrual cycle.

- Name the phases **A** and **B** that show the changes occurring in the ovary. (02)
- The growth of an ovum to a stage where it can be released, occurs during phase **A**. What is the endocrine gland that secretes the hormone responsible for this? (01)
- Write the hormone secreted by **x** during phase **A** of the menstrual cycle and the hormone secreted by **y** during phase **B**. (02)



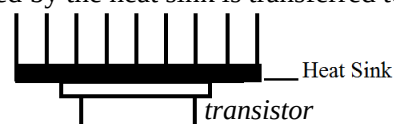
(C) The figure shows an incomplete circuit diagram for the speaker of an ice cream van that emits musical tones.

- What are the terminals labelled **P**, **Q**, and **R** of the transistor? (02)
 - Which two terminals among **A**, **B**, and **C** should the positive and negative terminals of the power supply be connected to, respectively? (02)
 - What benefit can be achieved by using the transistor in this circuit? (01)
- A current corresponding to a musical tone, varying due to **UM 66**, is supplied to points **x** and **y**. The sound is produced by the speaker due to a force exerted on the paper cone of the speaker by the wound copper wire coil, corresponding to that electric current.
 - Name the law that can explain how the force is exerting on the wire coil of the speaker. (01)
 - State a factor that affects the magnitude of the force exerted on the wire coil. (01)



(iii) A heat sink is used as shown in the figure to prevent the transistor from overheating. The heat absorbed by the heat sink is transferred to the environment.

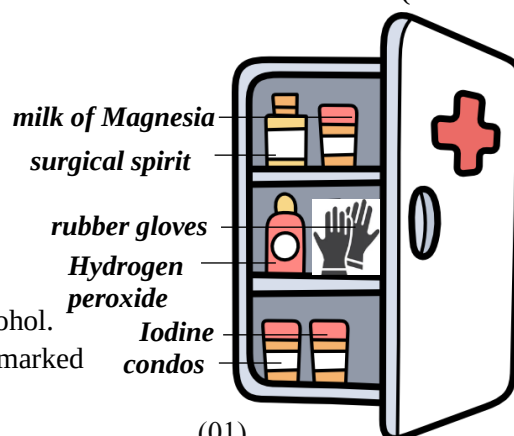
- What is the main heat transferring method by which the heat absorbed by the heat sink is transferred to the environment? (01)
- If the mass of the heat sink is 100 g, what is the amount of heat required to increase the temperature of the heat sink by 10°C? (Specific Heat Capacity of the heat sink = 900 J kg⁻¹ °C⁻¹) (02)



(20 marks)

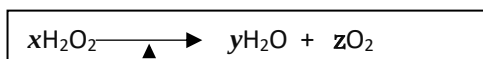
9. (A) The figure shows several items found in a school's first-aid box.

- Write which of the substances in the first-aid box is relevant to the information given below.
 - The basic unit is isoprene. (01)
 - Acts as an antacid in case of gastric acidity. (01)
 - Turns purple when dissolved in water. (01)



(ii) Surgical spirit is an aqueous solution containing isopropyl alcohol. A label on an unopened bottle with a volume of 250 cm³ was marked as 70% V/V.

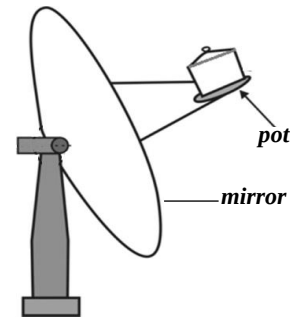
- What is the meaning of 70% V/V here? (01)
 - What is the volume of water contained in the solution? (02)
 - Name the solute and the solvent in this solution separately (02)
- (iii) A student wrote the balanced equation for the decomposition reaction of Hydrogen Peroxide as follows:



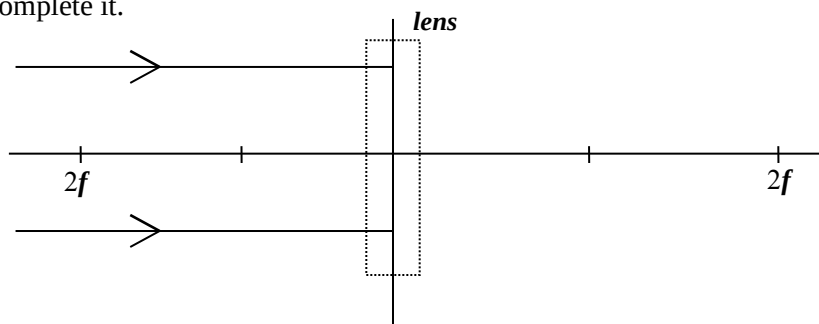
- (a) State the suitable values for x , y , and z in the above equation, in order. (01)
 (b) Hydrogen Peroxide is stored in amber coloured (brown) bottles. What is the reason for this. (01)

(B) The figure shows a diagram of a solar thermal oven used to cook food at a camp.

The distance between the pole and the center of curvature of the mirror used is 2 m.



- (i) What type of mirror is used for the oven? (01)
 (ii) What should be the distance between the mirror and the pot to provide maximum heat energy to the pot? (01)
 (iii) What type of electromagnetic wave emitted by the sun is used to cook food in the oven? (01)
 (iv) State two characteristics of the electromagnetic wave you mentioned. (02)
 (v) A student states that using small pieces of plane mirrors to achieve the shape of the mirror is more suitable for this oven. What could be the reason for that? (02)
 (vi) It is planned to prepare a solar thermal oven using a large lens instead of a mirror.
 (a) What type of lens is most suitable for this? (01)
 (b) Copy the incomplete diagram showing the path of heat radiation through the lens in such an oven and complete it. (02)



(20 marks)

Answers – Paper I

1	1	5	1	9	2	13	3	17	1	21	4	25	3	29	1	33	3	37	1
2	3	6	3	10	4	14	4	18	2	22	3	26	1	30	2	34	3	38	3
3	4	7	1	11	2	15	3	19	3	23	4	27	2	31	2	35	4	39	2
4	2	8	3	12	3	16	2	20	3	24	4	28	4	32	1	36	3	40	2

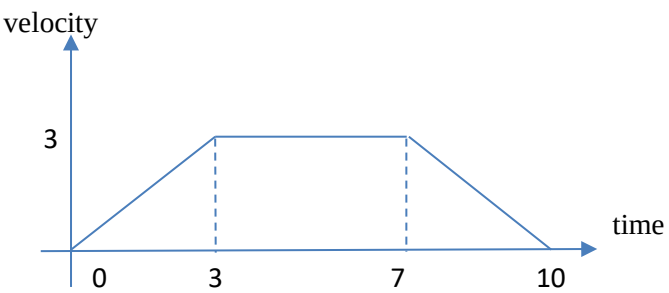
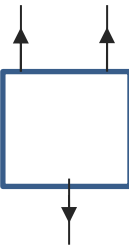
Part A – Structured Essay

1				
(A)	i.	(a)	Multiple cropping /Poly culture	01
		(b)	Reduced disease spread / Limited pest invasion / Receiving a yield from several crops.	01
	ii.	(a)	Reuse	01
		(b)	Recycling / New plastic goods from old plastic bottles and bags / Fabric (Textiles) / Raw materials for road construction / Fuel production	01
	iii.		Receiving oxygen necessary for respiration / Receiving food / An answer like favorable environmental conditions.	01
	iv	(a)	Favorable for life / Ability to maintain optimum temperature / Increased crop yield	01
		(b)	CO ₂ /Carbondioxide	01
		(c)	Global warming	01
	v		Depletion of Ozone layer .	01
	vi	(a)	The distance covered by a unit mass of a certain food, from the place where it is produced to the place where it is consumed	01
		(b)	when food miles are minimized, the distance decreases. As a result, the use of fuel required for transportation is reduced. Therefore, the amount of carbon dioxide released into the environment is minimized. This leads to the reduction of the increase in global warming .	01
(B)	i		2023	01
	ii	(a)	2025	01
		(b)	From <u>aug. 28</u> to <u>aug. 31</u>	01
	iii		Asthma / Lung Cancer / Inflammation of the respiratory tract / Bronchitis / Frequent respiratory infections.	01
				15
2				
(A)	i		Dicotyledonae plant	01
	ii		Reticulate venation/ Branched stem	01
	iii		A - Heterotrophic D - Autotrophic	02
	iv		A and C	02
	v		A	01

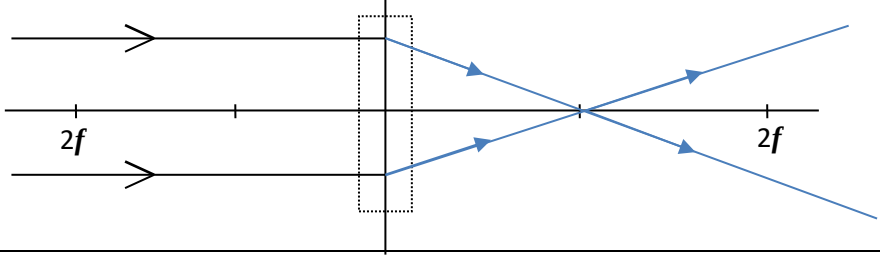
(B)	i.		Cell wall present in Q .Absent in P . /Large vacuole present in Q . Absent in P Chloroplasts present in Q . Absent in P	02
	ii.		Controlling all cellular activities.	01
	iii		16	01
(C)	i.	(a)	(a)T , (b) t, (c) T, (d) tt	02
	ii.	(a)	No.	01
		(b)	Thalassemia arises due to a gene mutation. However, an idea/concept such as the Thalassemia-related gene not being located on the sex chromosomes.	01
				15
03				
(A)	i		For correctly recording the group numbers using Roman numerals	02
	ii	(a)	Al/ Mg	01
		(b)	C/S	01
		(c)	B	01
	iii		Hg , Ag and Au in orderly	03
	iv		H, F,Cl,N,O one mark for each box	02
(B)	i.		c	01
	ii.		Lewis structure of water molecule	02
	iii		b	01
	iv		a	01
				15
(4)				
(A)	i.		Greater. Greater.	02
	ii.		First and second instances : velocity First and third instances : mass	02
	iii.		$p = mv$	01
	iv		First Law	01
	v		$F = ma$, $2N = 1 \text{ kg} \times a$, $a = 2 \text{ m s}^{-2}$	01
	vi		Perpendicular Reaction	01
(B)	i.		Moment = Force x p. distance to r.axis = $500 \text{ N} \times 5 \text{ m}$ = 2500 N m	02
	ii.	(a)	$E = mgh$ $2000 \text{ J} = 50 \text{ kg} \times 10 \text{ m s}^{-1} \times h$ $h = 2000/500$ $h = 4 \text{ m}$	01
		(b)	Electrical energy = stored potential energy = 2000 J	01
	iii	(a)	because the circuit will not be automatically disconnected if an electrical leak occurs / because the Residual Current Circuit Breaker (RCCB) is not connected	01
		(b)	☐ Device Safety: Miniature Circuit Breaker (MCB) ☐ Operator Safety: Residual Current Circuit Breaker (RCCB)	02
				15

Part B - Essay

05				
(A)	i.		Connective Tissues	01
	ii.		It is composed of a fluid matrix and body cells (corpuscles). Red blood cells, white blood cells, and platelets are suspended within the plasma. Fibers are not always appeared in blood tissue, and fibers are only formed during coagulation.	01
	iii		Transport of substances / Defense / Maintenance of homeostasis	01
	iv		x - Red Blood Cells y - White Blood Cells	02
	v		x	01
	vi	(a)	Smooth muscle tissue	01
		(b)	Walls of the alimentary canal (digestive track) / Walls of the urinary bladder	01
		(c)	Spindle shape / Lack of striations	01
(B)	i		A – Carbon dioxide B – Oxygen	02
	ii		Chlorophyll	01
	iii		Ethyl Alcohol	01
	iv		$6\text{O}_2 + \text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{Energy}$	02
(C)	i		Lower diameter of of Efferent arteriole / a than Afferent arteriole / b	01
	ii		Body cells (Red blood cells / White blood cells / Platelets) / Plasma proteins (Albumin / Globulin / Fibrinogen) / Such as fatty acids, glycerol	01
	iii		Glucose/Amino acids	01
	iv		for explaining at least two points, such as: preventing conditions like kidney infections and the formation of kidney and bladder stones due to the excessive concentration of salt items.	02
				20
06				
(A)	i		Water and oxygen	02
	ii	(a)	Yes	01
		(b)	Salt is a factor that accelerate rusting .Sea water has a high content of salt	01
	iii		$\text{Fe} \rightarrow \text{Fe}^{2+} + 2\text{e}^-$ or $2\text{Fe} \rightarrow 2\text{Fe}^{2+} + 4\text{e}^-$	02
	iv	(a)	HCl	01
		(b)	Because strong acids are corrosive and can cause burn injuries.	01
	v	(a)	Zinc (Zn)	01
		(b)	Using a salt solution of copper and a copper plate instead of zinc.	01
		(c)	Because Zinc is more reactive than Iron, even if the Zinc coating is scratched, the Iron is protected from rusting. (Because Copper metal is less reactive than Iron, when the Copper coating is scratched, the Iron is rusted even more.)	01
(B)	i	(a)	Because the reaction of Sodium with water is exothermic	01
		(b)	Emission of smoke / moving with a fizzing sound / catching fire or exploding.	01
	ii	(a)	pink	01

		(b)	Become of alkaline solution /formation of NaOH /formation of OH ⁻	01
	iii.	(a)	Because an explosion may occur during the reaction	01
		(b)	Zinc or Aluminum with HCl	02
	iv		Downward displacement over water. /Being able to calculate the rate of reaction./ Being able to observe the gas collecting. etc	02
				20
07				
(A)	i			02
	ii		Height moved = Area of the trapezium $= \frac{(\text{Sum of parallel lines}) \times \text{P.H}}{2}$ $= \frac{14 \times 3}{2}$ $= 21 \text{ m}$	02
	iii		4 s	02
	iv	(a)		02
		(b)	$1000/2 = 500 \text{ N}$	02
(B)	i		From A to B	01
	ii	(a)	S ₁ should be opened. S ₂ should be opened.	01
		(b)	S ₁ should be closed. S ₂ should be opened.	01
	iii		$\frac{1}{R_1} + \frac{1}{R_2}$ $\frac{1}{1} + \frac{1}{3}$ $= \frac{3}{4} + 1, 1.75 \Omega$	02
(C)	i		The piston must be pushed forward .	01
	ii	(a)	U = W	01
		(b)	U < W	01
	iii		$P = h\rho g$ $P = 0.5 \text{ m} \times 1000 \text{ kg m}^{-3} \times 10 \text{ m s}^{-2}$ $P = 5000 \text{ Pa}$	02
				20
08				
(A)	i		Coolant property / Solvent property / Cohesive force / Adhesive force / Anomalous expansion	02

	ii	(a)	Enzymes	01
		(b)	protein	01
		(c)	C,H,O,N for two elements	01
(B)	i		A – Follicular phase B – Luteal Phase	02
	ii		Pituitary gland	01
	iii		x – oestrogen y - progesterone	02
(C)	i	(a)	P – Collector Q - Base R - Emitter	02
		(b)	Positive terminal - A Negative terminal - B	02
		(c)	Amplifier	01
	ii	(a)	Fleming's left hand Rule	01
		(b)	Magnitude of the current flowing through the conductor / Length of the conductor placed within the magnetic field / Strength of the magnetic field.	01
	iii	(a)	convection/ radiation	01
		(b)	$Q = mc\theta$ $= 0.1 \text{ kg} \times 900 \text{ J kg}^{-1} \text{ } ^\circ\text{C}^{-1} \times 1^\circ\text{C}$ $= 90 \text{ J}$	02
				20
09				
(A)	i	(a)	Rubber gloves	01
		(b)	Milk of magnesia	01
		(c)	Condos	01
	ii	(a)	The idea that the solution contains 70% Isopropyl Alcohol by volume	01
		(b)	$30/100 \times 250$ $= 75 \text{ cm}^3$	02
		(c)	Solute - water Solvent - Isopropyl Alcohol	02
	iii	(a)	2,2 and 1	01
		(b)	Hydrogen peroxide decomposes in the presence of light. / Light and ultraviolet rays pass less through brown glass.	01
(B)	i		Concave mirror	01
	ii		1 m	01
	iii		Infra red /(IR)	01
	iv		These waves are not affected by electric and magnetic fields. A medium is not required for propagation. / Travels at a speed of $3 \times 10^8 \text{ m s}^{-1}$ in a vacuum	02
	v		A larger amount of light received over a given area can be focused onto a single point, which allows a large amount of heat to be obtained at that single point.	02
	vi	(a)	Convex lens	01

		(b)		02
				20

Important

- Provide marks if the correct answer is supplied other than the answer given in the script.
(Answer written by understanding the concept relevant to the question)
- Do not provide marks if the unit is not indicated with the final answer where it is must.
- Consider this is as a pre practice for G.C.E'(O/L) examination when providing marks and discussing
- the answers with students after correcting.