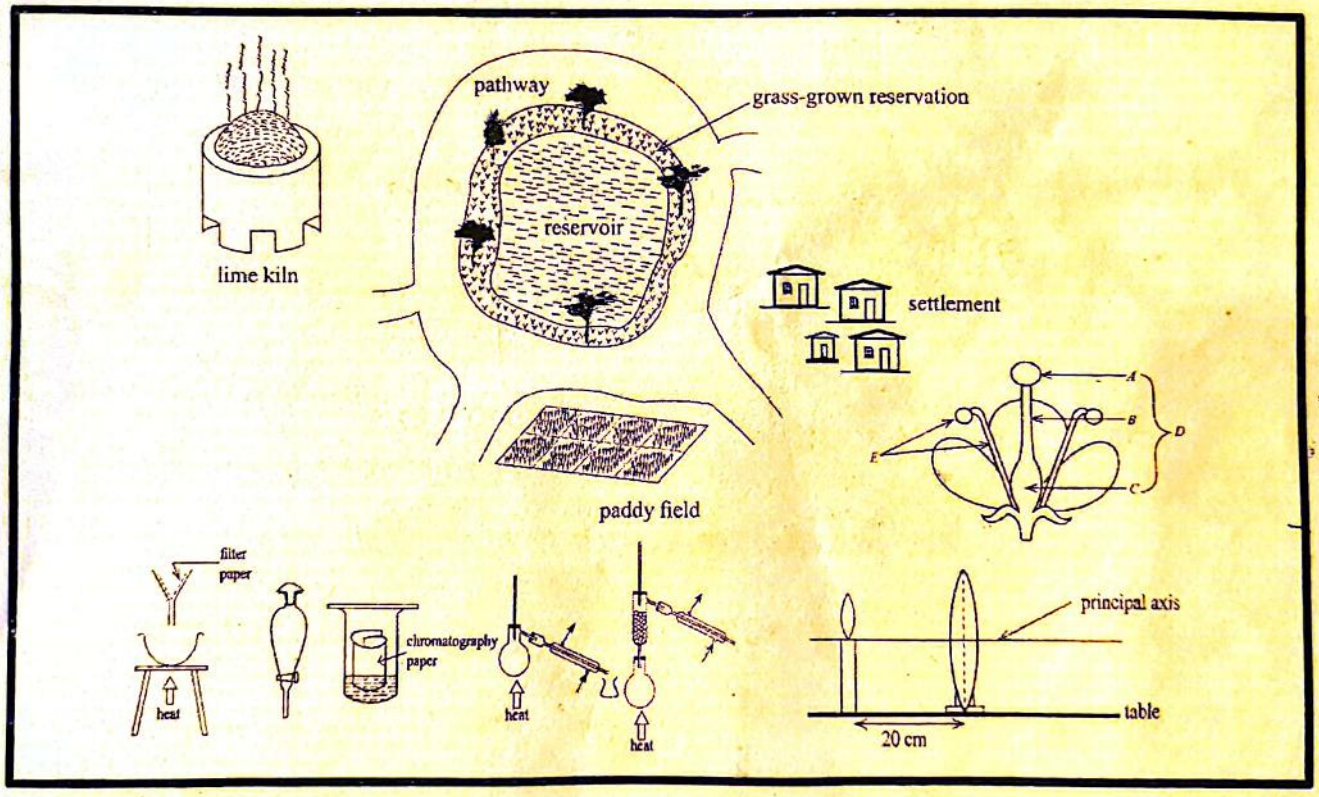
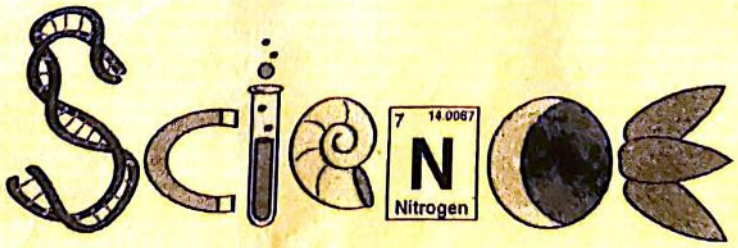
Department of Examinations-Sri Lanka

G.C.E. (O/L) Examination - 2024 (2025)

34 - Science

Marking Scheme





This document has been prepared for the use of Marking Examiners. Some changes would be made according to the views presented at the Chief Examiners' Meeting

Amendments to be included

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

34 E I

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2024(2025)
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2024(2025)
General Certificate of Education (Ord. Level) Examination, 2024(2025)

විද්‍යාව I
விஞ்ஞானம் I
Science I

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. To which of the following tissues does the cell type stone cells belong?
   (1) meristematic (2) parenchyma (3) collenchyma (4) sclerenchyma

2. Of the following pairs, the pair of vector quantities is,
   (1) force and mass. (2) pressure and acceleration.
   (3) speed and work. (4) velocity and displacement.

3. Which of the following is the element that acts as an intrinsic semiconductor at the room temperature?
   (1) Cu (2) Al (3) Si (4) Fe

4. Which of the following indicates the symbols of the elements zinc, sodium and silver respectively?
   (1) Sn, S, Si (2) Zn, Na, Si (3) Zn, Na, Ag (4) Sn, Zn, S

5. Select the option that correctly indicates the scientific name of plant mango.
   (1) Mangifera indica (2) *Mangifera indica* (3) mangifera indica (4) *mangifera indica*

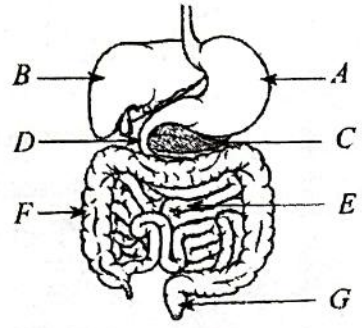
6. Which organelle of the cell transmits the hereditory characteristics from generation to generation?
   (1) mitochondria (2) nucleus (3) Golgi bodies (4) ribosomes

7. From which of the following structures in the ovaries of the female reproductive system an ovum is released?
   (1) corpus luteum (2) corpus albicans (3) graffian follicle (4) primary follicle

8. Cutting a yam with a well sharpened knife is easier. The reason for this is,
   (1) the ability to apply a greater force.
   (2) the ability to apply a greater pressure.
   (3) lessening the friction between the yam and the knife.
   (4) lessening the weight of the knife during sharpening.

9. The formula of the compound formed by the element X with oxygen is XO while the formula of the compound formed by the element Y with sodium is NaY. What is the formula of the compound formed by the combination of X and Y?
   (1) XY (2) X_2Y (3) XY_2 (4) XY_4

- Question numbers **10** and **11** are based on the following sketch of the human digestive system.

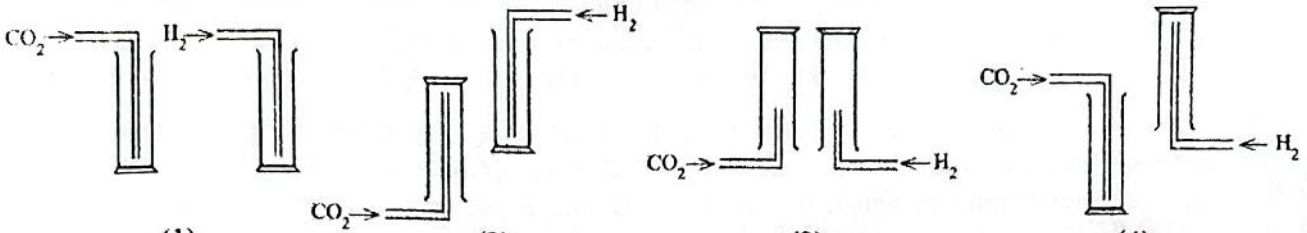


10. Which of the following options indicates the path the food passes through from A to G in this system respectively?
    (1) B, C, D (2) C, D, E
    (3) D, E, F (4) D, C, E

11. If a little food is taken out from the sites A and D and pH papers were put into them separately, the pH values which correspond with the colour change occurring in them respectively would be,
    (1) 3.5 and 7.5 (2) 3.5 and 4.0 (3) 7.5 and 3.5 (4) 7.5 and 8.5

12. Which of the following is the **false** statement about the resistance of a metallic conductor?
(1) It depends on the temperature.
(2) It is directly proportional to the length.
(3) It is inversely proportional to the area of cross section.
(4) It depends on the potential difference across it.

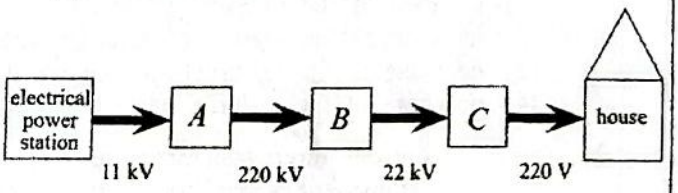
13. Which of the following is the correct way of positioning the delivery tubes to collect two samples of the gases carbon dioxide and hydrogen into gas jars?



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

14. Which of the following is **not** a property of synthetic linear polymers?
(1) easily biodegradable (2) combustible
(3) resistant to acids (4) electrical insulators

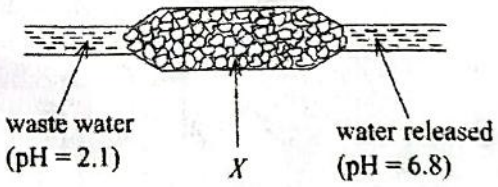
15. This block diagram indicates some main stages of a route of transmitting electricity from an electrical power station to houses. What is the option that gives the transformer types indicated as *A*, *B* and *C* in it respectively?



(1) step-up, step-down, step-down (2) step-up, step-up, step-up
(3) step-down, step-up, step-up (4) step-down, step-down, step-up

16. Which chamber of the human heart has the thickest walls?
(1) left atrium (2) right atrium (3) left ventricle (4) right ventricle

17. The waste water released by a factory was passed through a packing of a solid substance *X* as shown in the figure before emptying into the environment.
Which of the following statement can be true about the waste water and *X*?
(1) Waste water is acidic and *X* is sand.
(2) Waste water is basic and *X* is sand.
(3) Waste water is acidic and *X* is limestone.
(4) Waste water is basic and *X* is limestone.



18. When the cap of a bottle of soda water is opened, carbon dioxide gas bubbles are liberated. More over, carbon dioxide gas bubbles are liberated faster when a bottle of soda water kept outside a refrigerator is opened than when a bottle of soda water kept inside a refrigerator is opened. According to these observations, under which of the following conditions could it be concluded that the solubility of carbon dioxide in water increases?
(1) higher pressure and higher temperature (2) higher pressure and lower temperature
(3) lower pressure and higher temperature (4) lower pressure and lower temperature

19. Which of the following statement is true about the image formed by a plane mirror?
(1) The image is formed on the side of the object itself.
(2) The size of the image depends on the size of the mirror.
(3) The image is laterally inverted.
(4) The image distance depends on the geometrical shape of the mirror.

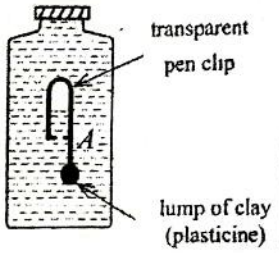
20. A telecommunication satellite is orbited at a height of 36 000 km from the level of the Earth. What is the time taken in seconds for a radio wave sent by a transmitting station on the Earth to reach the satellite? (Speed of radio waves in air is $3{\cdot}0\times10^8$ m s^{-1}.)
(1) $\frac{36000}{3{\cdot}0\times10^8}$ (2) $\frac{3{\cdot}0\times10^8}{36000}$ (3) $\frac{3{\cdot}0\times10^8}{3{\cdot}6\times10^7}$ (4) $\frac{3{\cdot}6\times10^7}{3{\cdot}0\times10^8}$

21. When a small amount of Benedict solution is added to a certain food extract and heated, no colour change occurred. When a little of dilute sulphuric acid is added to it and heated, the solution turned orange. The nutrient contained in this food extract would be,
(1) glucose. (2) sucrose. (3) fat. (4) protein.

22. Consider the following characteristics possessed by a living species.
A - An organized nucleus is absent.
B - can be destroyed by antibiotics
C - can be either pathogenic or autotrophic
Of these, the characteristics owned by the organisms belonging to domain bacteria are,
(1) only *A* and *B*. (2) only *A* and *C*. (3) only *B* and *C*. (4) all *A*, *B* and *C*.

23. The metals *P* and *Q* react with dilute acids liberating hydrogen gas while the metal *R* does not liberate hydrogen with dilute acids. *P* cannot displace *Q* from a solution of a salt of *Q*. What is the sequential order in which the metals *P*, *Q* and *R* are placed in the activity series?
(1) *P*, *Q*, *R* (2) *Q*, *P*, *R* (3) *P*, *R*, *Q* (4) *R*, *P*, *Q*

24. An arrangement named *A* has been introduced into a well stoppered plastic bottle filled with water so that it floats immersed. When the bottle is squeezed at its middle the arrangement *A* moves down the bottle. The reason for this is,
(1) increase in the pressure of water.
(2) increase in the weight of arrangement *A*.
(3) decrease in the upthrust exerted on *A*.
(4) decrease in the volume of water.

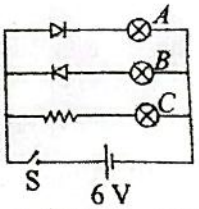


25. Given below are three statements relating to motion of waves.
A - Transverse waves travel in a direction perpendicular to the direction of the vibration of particles in the medium.
B - Longitudinal waves can travel in free space (vacuum).
C - Electromagnetic waves travel at the same speed in any medium.
The correct statement/s of the above is/are,
(1) only *A*. (2) only *B*. (3) only *A* and *B*. (4) only *B* and *C*.

26. Of the two solutions *A* and *B*, no colour change occurred when a few drops of phenolphthalein was added to solution *A*. When equal volumes of solutions of *A* and *B* of equal concentration were mixed and allowed to react, an aqueous solution of *C* was obtained and its pH was 7. The solutions *A*, *B* and *C* respectively could be,
(1) HCl, NaOH and NaCl. (2) HCl, NaCl and NaOH.
(3) NaOH, HCl and NaCl. (4) NaOH, NaCl and HCl.

27. The carbohydrate products first formed during photosynthesis, stored temporarily in chloroplasts and translocated through the phloem respectively are,
(1) monosaccharides, disaccharides and polysaccharides.
(2) monosaccharides, polysaccharides and disaccharides.
(3) disaccharides, polysaccharides and monosaccharides.
(4) polysaccharides, monosaccharides and disaccharides.

28. When the switch S is closed in this circuit,
(1) bulbs *A* and *B* light. (2) bulbs *B* and *C* light.
(3) bulbs *A* and *C* light. (4) all the bulbs light.



29. The number of autosomes and the sex chromosome that can be present in a human ovum respectively are,
(1) 22 and *Y*. (2) 22 and *X*. (3) 23 and *Y*. (4) 23 and *X*.

30. What is the option which correctly indicates how the curvature of the diaphragm and the volume of the thorasic cavity change when inspiration occurs in the respiratory process of a human?

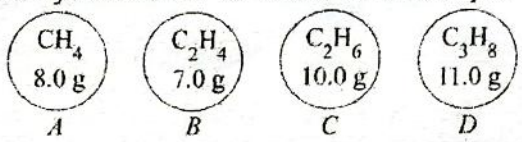
	curvature of the diaphragm	volume of the thorasic cavity
(1)	increases	increases
(2)	increases	decreases
(3)	decreases	increases
(4)	decreases	decreases

31. The power of an electric heater is 1 000 W. The amount of electrical energy spent when this heater operated for a period of 2 hours was,
(1) 0.5 kW h. (2) 2 kW h. (3) 500 kW h. (4) 2 000 kW h.

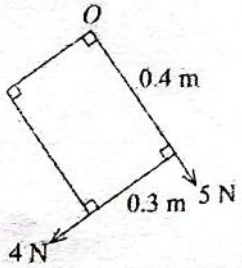
32. Which of the following metals can be used for cathodic protection of iron?
(1) Ag (2) Cu (3) Sn (4) Zn

33. The force exerted vertically upwards on a rocket of mass m due to combustion of fuel is R. If g is the acceleration due to gravity, the acceleration with which the rocket moves is,
(1) $\frac{R-mg}{m}$. (2) $\frac{R}{m}$. (3) $\frac{R-m}{mg}$. (4) $\frac{R}{mg}$.

34. Given in the figure are masses of four gaseous hydrocarbons. In which of them equal number of molecules are contained? (C=12, H = 1)
(1) A and B (2) A and C
(3) B and D (4) C and D

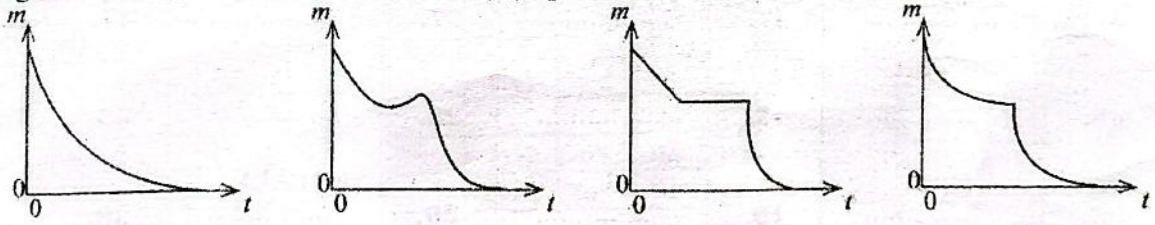


35. A light, rectangular lamina 0.4 m × 0.3 m is pivoted at point O and two forces 5 N and 4 N are applied on it as shown in the diagram. What is the moment of force on the lamina around the point O?
(1) 1.6 N m anticlockwise (2) 1.6 N m clockwise
(3) 1.5 N m anticlockwise (4) 1.5 N m clockwise



36. The boiling points of hydrogen chloride and water are -85 °C and 100 °C respectively. Which of the following statements explains the cause for this difference?
(1) The intermolecular forces among hydrogen chloride molecules are weaker than the intermolecular forces among water molecules.
(2) The relative molecular mass of hydrogen chloride is greater than the relative molecular mass of water.
(3) The covalent bonds among the atoms are stronger in water than those in hydrogen chloride.
(4) Water molecules are polar whereas hydrogen chloride molecules are non-polar.

37. A sheet of zinc suspended on a spring balance is immersed in a hydrochloride acid solution bringing them to react. Some time after the beginning of the reaction another quantity of the acid solution was added into the reaction mixture. If the spring balance reading (m) was plotted against time (t), which of the following graphs is most likely to be obtained?



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

38. Of the following, which one is the **false** statement?
(1) Acid rains occur due to release of chlorofluorocarbons to the atmosphere.
(2) Greenhouse effect is necessary to maintain life.
(3) Greenhouse effect affects global warming.
(4) Oxides of nitrogen affect depletion of the ozone layer.

39. Which of the following disaster conditions has the minimum influence of humans?
(1) occurrence of tsunami (2) occurrence of photochemical smog
(3) spread of invasive alien plants (4) invasion of settlements by wild animals

40. In a traditional tank (wewa), what is the structure that prevents the erosion of the tank bund?
(1) bisokotuwa (2) ralapanawa (3) out spill (4) wew thaulla

* * *

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව

இலங்கைப் பரீட்சைத் திணைக்களம்

රහස්‍යයි
அந்தரங்கமானது

අ.පොස. (සා.පෙළ) විභාගය - 2024 (2025)
க.பொ.த. (சா.தர)ப் பரீட்சை - 2024 (2025)

විෂය අංකය
பாட இலக்கம் 34

විෂයය
பாடம் **Science**

I පත්‍රය - පිළිතුරු
I பத்திரம் - விடைகள்

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

විශේෂ උපදෙස්
விசேட அறிவுறுத்தல்
} එක් පිළිතුරකට ලකුණු
ஒரு சரியான விடைக்கு **01** බැගින்
புள்ளி வீதம்

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

පහත නිදසුනෙහි දැක්වෙන පරිදි බහුවරණ උත්තරපත්‍රයේ අවසාන තීරුවේ ලකුණු ඇතුළත් කරන්න.
கீழ் குறிப்பிடப்பட்டிருக்கும் உதாரணத்திற்கு அமைய பல்தேர்வு வினாக்களுக்குரிய புள்ளிகளை பல்தேர்வு வினாப்பத்திரத்தின் இறுதியில் பதிக.

නිවැරදි පිළිතුරු සංඛ්‍යාව
சரியான விடைகளின் தொகை
25
40

I පත්‍රයේ මුළු ලකුණු
பத்திரம் I இன் மொத்தப்புள்ளி
25
40

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

34 | E | II

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2024(2025)
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2024(2025)
General Certificate of Education (Ord. Level) Examination, 2024(2025)

විද්‍යාව	II
விஞ்ஞானம்	II
Science	**II**

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

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

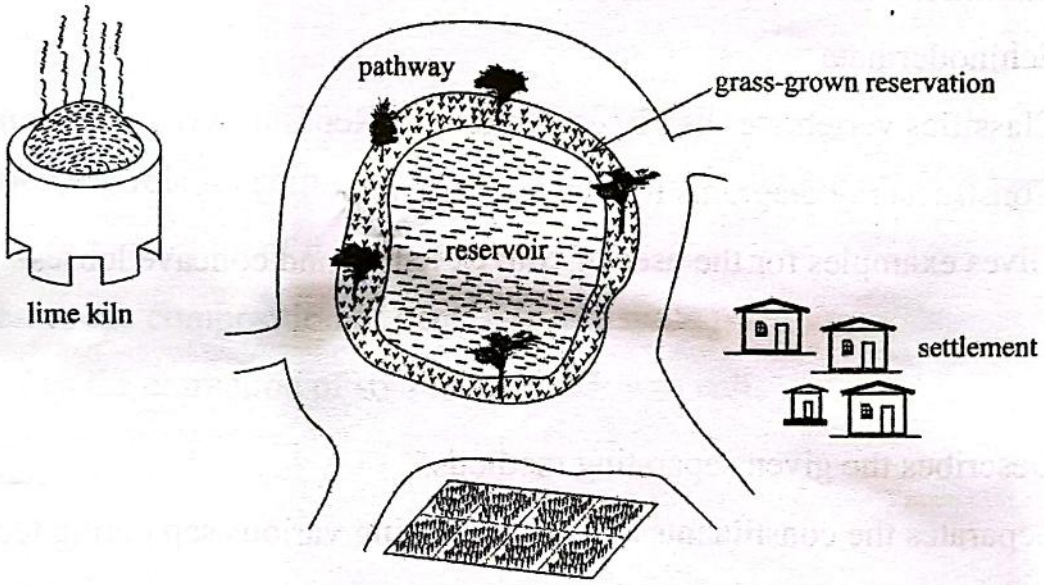
Use additional reading time to go through the question paper, select the questions you will answer and decide which of them you will prioritise.

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*) The following figure presents several ecosystems that associate a reservoir of water.



(i) A food chain found in the environment accompanying this paddy field is indicated below.

Grass plant ⟶ Grasshopper ⟶ Myna

(a) In which organism does the largest amount of agrochemicals applied to the paddy field concentrate? ***(01 mark)***

Myna .....

(b) What is the process that makes the grass plant act as the producer? ***(01 mark)***

Photosynthesis .....

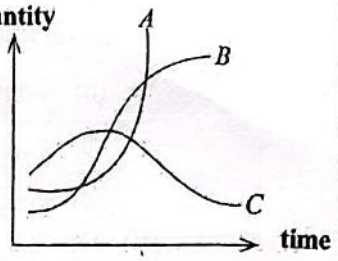
(ii) Growing of algae varieties as a green coloured layer floating on the surface of this reservoir has been taking place for a certain period of time.

(a) By what name is this condition known? **eutrophication** ***(01 mark)*** .....

(b) Name a type of ion causing this condition. ***(01 mark)***

Nitrate / Phosphate / NO_3^- / PO_4^{3-} / HPO_4^{2-} / $H_2PO_4^-$ .....

(iii) The graph below indicates several curves relevant to various variations associating this reservoir within a period of several months.



(a) Which curve corresponds to the growth of algae in the reservoir?
B (01 mark)

(b) Which curve corresponds to the oxygen concentration of the reservoir?
C (01 mark)

(c) Describe briefly the reasons for the assumption of respective shapes by the two curves selected for (a) and (b) above.
B - Normal growth curve of a population / giving the reason for it'
C - After the growth / increase in population, O_2 concentration decreases (02 marks)
increasing O2 consumption / no consumption

(iv) State **two** environmental problems that would emerge because of the presence of the lime kiln in this location.
Increase in temperature of the environment / soil becoming basic / water in the reservoir becoming basic / increase in the growth of algae / respiratory diseases caused on the people living in the settlement / collection of particulate substances / (02 marks)
liberation of heat to the environment
environmental pollution / air pollution / increasing co2 concentration

(*B*) Select the organism matching each description given and write the relevant letter on the dotted line.

(a) earthworm (b) colocasia (habarala) (c) frog (d) amoeba (e) carp (f) selaginella

give marks for names.

(i) A unicellular organism which is likely to be present in a sample of water taken from this reservoir (..d (01 mark)

(ii) A non-flowering plant that would have grown in the grass-grown reservation (..f..(01 mark)

(iii) An animal belonging to phylum Annelida that would be found in wet soil associated with the reservoir (..a (01 mark)

(iv) A plant with an underground stem that may be found in association with the reservoir (..b (01 mark)

(v) A vertebrate having a thin moist, grandular skin that would be encountered in this ecosystem (..c (01 mark)

2. (*A*) Nucleic acids are a main type of biomolecules contained in living matter.

(i) (a) What is the structural unit of nucleic acids? nucleotide (01 mark)

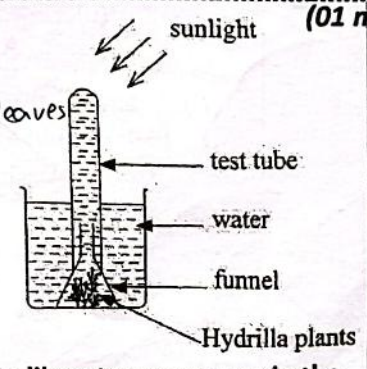
(b) In addition to carbon, hydrogen and oxygen, name the other **two** elements that are necessarily contained in nucleic acids. nitrogen / N and phosphorus / P (02 marks)

(ii) Name the **two** types of nucleic acids and state a structural difference between them. (01 mark)

(a) two types of nucleic acids DNA and RNA / deoxyribonucleic acid and ribonucleic acid

(b) structural difference In DNA, building block is deoxyribonucleotide where as in RNA it's ribonucleotide / DNA has a double helix structure but RNA lacks a double helix. (It's a single structure) (01 mark)

(*B*) Given below is a diagram of an experimental set up relating to photosynthesis.



(i) What is the observation that can be made sometime after the setting up of this apparatus? gas bubbles deposited on the leaves
Gas bubbles evolve/ A gas gets collected in the test tube. / Water level in the test tube decreases (01 mark)

(ii) What test should be done to arrive at a conclusion from the observation in (i) above? (01 mark)
giving
Bringing a lighted splint close to the gas collected

(iii) What is the conclusion that could be made from that test?
Oxygen gas is liberated during photosynthesis / Green plants liberate oxygen gas in the presence of sun light (01 mark)

(iv) When some soda water is mixed to the water in the beaker while arranging this set up, the time to make that observation decreases. State the reason for this briefly.
On addition of soda water to water, CO_2 gas is added to the medium (01 mark)
Then rate of photosynthesis increases (01 mark) or
When CO_2 concentration increases, rate of photosynthesis increases (02 marks)

(C) (i) Several main tissue types found in the human body are given below.

- epithelial tissues
- connective tissues
- skeletal muscle tissues

State which of the above tissues are present in each of the following.

(a) blood : connective tissue (01 mark)

(b) wall of the urinary bladder : epithelial tissue (01 mark)

(c) epidermis of the skin : epithelial tissue (01 mark)

(ii) The nervous tissue has three types of neurones according to its functions. Of them, name each of the following types of neurones.

(a) The type of neurones transmitting impulses from the receptors to the central nervous system :
afferent neurone / sensory neurone (01 mark)

(b) The type of neurones transmitting impulses from the central nervous system to the effectors:
efferent neurone / motor neurone (01 mark)

3. (A) The figure indicates places occupied by five elements belonging to the first three periods of the periodic table which exist as diatomic molecules in their free state.

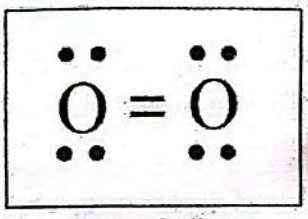
H							
				N	O	F	
						Cl	

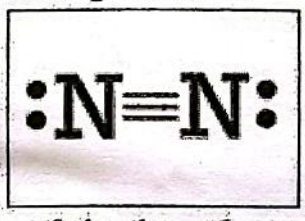
(i) Write the elements N, O and F

(a) in the ascending order of their electronegativity. N, O, F (01 mark)

(b) in the ascending order of their first ionisation energy. O, N, F / (01 mark) NOF

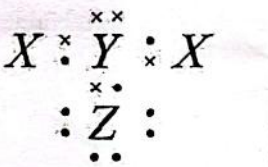
(ii) From the elements given, select the elements in which there are multiple bonds (more than one covalent bond) between the two atoms of their free molecules and draw the Lewis structures of their molecules in the boxes given below.





These two may be interchanged (02 marks)

(iii) The figure indicates a representation of the dot and cross structure of a molecule formed by the elements N, H and Cl. Write on the dotted lines the true symbols of the elements represented by the letters X, Y and Z in it.



X: H (01 mark) Y: N (01 mark) Z: Cl (01 mark)

(iv) In chlorine, there exist two isotopes $^{35}_{17}Cl$ and $^{37}_{17}Cl$.

(a) In isotopes, which sub-atomic particles differ in number? neutrons / n (01 mark)

(b) How many types of chlorine molecules with different masses exist in naturally occurring chlorine?
3 / three (01 mark)

(B) X and Y are two metals. X and Y are not their standard symbols. Observations made during two reactions involving metal X are summarized below.

X + hydrochloric acid ⟶ P (solution) + Q (colourless gas)

↓ potassium ferricyanide solution

blue coloured solution

↑ potassium ferricyanide solution

X + copper sulphate solution ⟶ R (solution) + Y (reddish brown solid)

(i) Identify X, Q and Y and write either their true name or the chemical symbol.

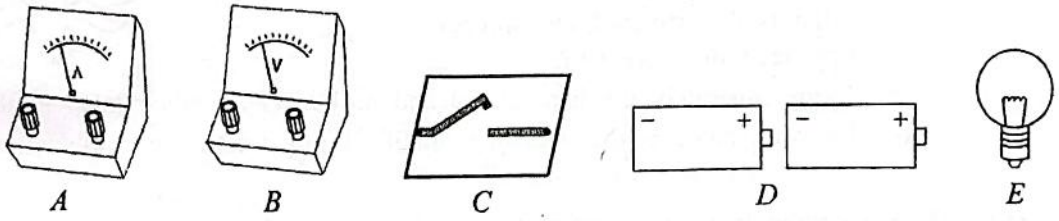
(a) X : iron / Fe (01 mark) (b) Q : hydrogen / H_2 (01 mark) (c) Y : copper / Cu (01 mark)

(ii) How do you identify gas Q experimentally? ..... (01 mark)
When a lighted splint / a flame is brought closer, it burns with a (Squeaky) "pop" ✓

(iii) In the sentence given below underline the appropriate words printed in boldface.

In a simple cell constructed using the two metals X and Y, X is the **anode/cathode** and the electric **current/electrons** flow(s) from X to Y. (01x2 = 02 marks)

4. (A) You have been assigned to construct a circuit to measure the potential difference across an electric bulb and the current flowing through it. The instruments which should be used for this are indicated below.



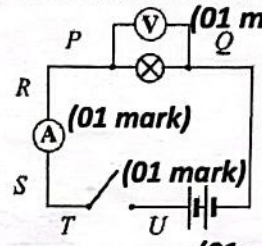
A B C D E

(i) Name the instruments indicated as A, B and C.

(a) A ammeter (01 mark) (b) B voltmeter (01 mark) (c) C switch / key (01 mark)

(ii) Using standard circuit symbols, draw in the following incomplete circuit diagram how you connect instruments A, B and C across the relevant pairs of points P and Q, R and S, and T and U.

ammeter and switch may be interchanged



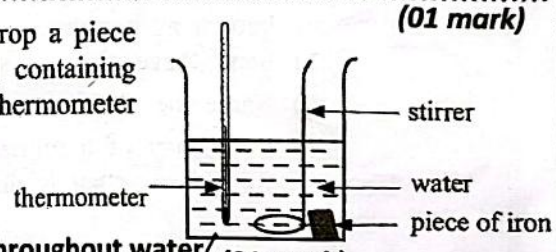
(iii) (a) Name the way instrument A is connected. in series (01 mark)

(b) Name the way instrument B is connected. in parallel (01 mark)

(iv) What is the extra device that should be connected to the circuit to increase/decrease the brightness of the bulb?

rheostat / variable resistor / pre-set resistors (give marks for symbols drawn also) (01 mark)
resistance box / volume control

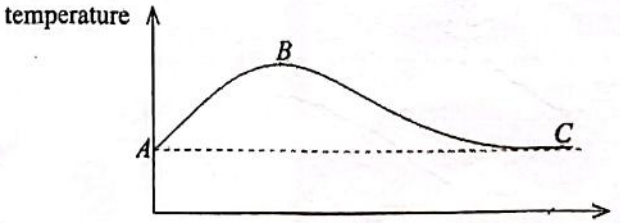
(B) For a certain experiment, you have been asked to drop a piece of iron heated to a high temperature into a vessel containing water at room temperature and obtain readings in the thermometer while stirring water.



(i) Explain why water has to be stirred in this experiment.

To distribute temperature / heat uniformly throughout water / throughout the container (01 mark)

(ii) The following graph indicates how the thermometer reading varies with time.



Write the instances of temperature variations and reasons for them in the following table.

	Temperature variation	Reason for the temperature variation
Part AB	(a) increases (01 mark)	(b) flow of heat from the piece of iron to water (01 mark)
Point B	Maximum temperature	Attaining thermal equilibrium
Part BC	(c) decreases (01 mark)	(d) flow of heat from water (the system) to the environment (01 mark)

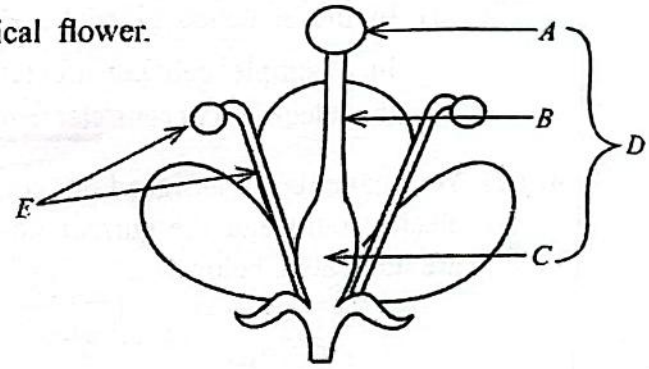
(iii) State the conclusion which you can draw from the above experiment.

Heat flows from a place / object at higher temperature to a place / object at lower temperature (01 mark)

Part B

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

5. (*A*) The figure shows a longitudinal section of a typical flower.



(i) Name the parts *A*, *B*, *C*, *D* and *E* in it.

(ii) What is pollination?

(iii) Write an adaptation of this flower to prevent self-pollination as illustrated in the figure.

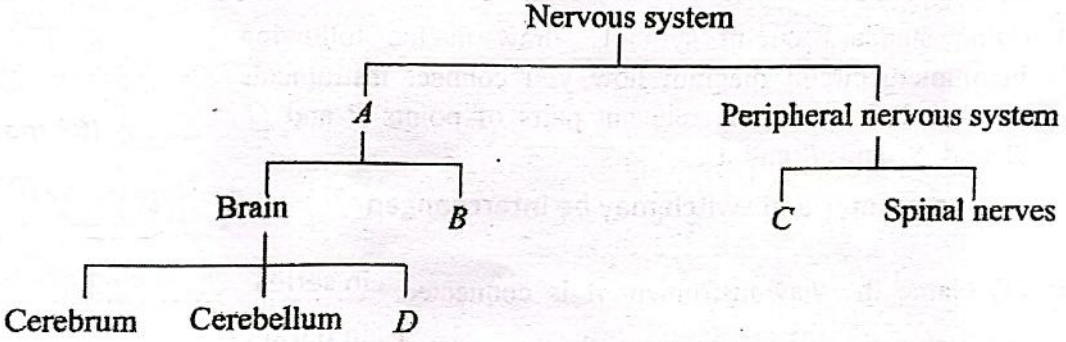
(iv) After pollination a male gamete and an ovum fuse to form a zygote.

(a) What is the name of the process described in above (iv)?

(b) Name separately the haploid (n) and diploid (2n) cells related to the above process.

(c) By what name is the phenomenon of fruiting without a combination of a male gamete and an ovum known?

(*B*) (i) One system that operates for the coordination of the human body is the nervous system. The structure of the nervous system can be illustrated by the following sketch.



(a) Name the structures indicated by the letters *A*, *B*, *C* and *D*.

(b) State **two** functions of the cerebellum.

(ii) The secretions of the endocrine system, the other system essential to maintain coordination are known as hormones.

(a) State **three** characteristics of hormones.

(b) Name the gland secreting the growth hormone and mention the location of that gland.

(c) Deficiency of a mineral nutrient essential to produce a certain hormone is the cause for goitre. What is this nutrient?

(20 marks)

(5)	(A)	(i)		• A Stigma • B style • C ovary • D gynoecium • E stamen / androecium / anthar and filament *If all are correct - 03 marks* *If 3 or 4 are correct - 02 marks* *If 1 or 2 are correct - 01 mark*	03
		(ii)		Deposition of mature pollen of a certain flower on the stigma of a flower of the same species	02/00
		(iii)		Occurrence of extrose stamens (turning of stamens away from stigma Occurrence of stigma above stamens heterostyly herkogamy / hercogamy	01
		(iv)	(a)	fertilization	01
			(b)	• haplid - male gamete and female gamete / gametes / pollen grains and ova • diploid - zygote *(Marks 01 ×2 = 02 Marks)*	02
			(c)	• parthenocarpy	01
	(B)	(i)	(a)	• A central nervous system • B spinal cord • C cranial nerve • D brain system / medulla oblongata *If 3 or 4 are correct - 02 marks* *If 1 or 2 are correct - 01 mark*	02
			(b)	Maintaining the equilibrium of body / controlling the action of voluntary muscles / contributing to execute body movements properly	02
		(ii)	(a)	• being organic compounds • transported by blood • produced in one place and acting at another place • stimulating target organs • sufficiency in very small concentrations *(any three)*	03
			(b)	pituitary (gland) *(01 mark)* below the hypothalamus in cerebrum *(01 mark)*	02
			(c)	free mark	01
				Total Marks	20

6. (*A*) On large scale iron is produced by heating a finely powered mixture of haematite (Fe_2O_3), limestone ($CaCO_3$) and coke (C) to a high temperature in a blast furnace.

(i) What is the advantage of crushing the mixture into fine powder?

(ii) The main reactions taking place in the blast furnace during this process are given below. Letters x, y and z in them represent three chemical compounds.

$CaCO_3 \xrightarrow{\Delta} x + y$ —— 1

$C + O_2 \longrightarrow y$ —— 2

$C + y \longrightarrow 2z$ —— 3

$Fe_2O_3 + 3z \longrightarrow 2Fe + 3y$ —— 4

$SiO_2 + x \longrightarrow CaSiO_3$ —— 5

Write in respective order the chemical formulae of the compounds represented by letters x, y and z.

(iii) Of the above reactions, which can be considered an acid-base reaction?

(iv) $CaSiO_3$ formed in the reaction 5 above, floats as slag on extracted, molten iron. What is the advantage brought about by this?

(v) According to equation 4, how many tons of haematite are needed to extract 70 tons of iron? (Fe = 56, O = 16)

(vi) Name a gas that is issued to the atmosphere when extracting iron by the above method and state an unfavourable effect of it on the environment.

(vii) A type of electricity conducting wires is made of an alloy with copper, magnesium and iron in the molar ratio of 7:2:1 respectively.

(a) What is the mole fraction of iron in this alloy?

(b) Suggest a method to separate metal copper from a piece of this alloy.

(viii) Scholars have estimated that, according to the present pattern of consumption of iron, the resources of iron in Earth will be adequate only for 240 years more. Suggest a measure that can be taken to assure the sustainable use of iron as a remedy for this.

(ix) Why metal sodium **cannot** be extracted by a method such as the above used to extract iron?

(*B*) Sodium metal is extracted in Downs cells by the electrolysis of fused (molten) sodium chloride. A graphite anode and an annular steel cathode are used here.

(i) Why sodium chloride should be fused in this task?

(ii) Indicating the relevant physical states, write the ion-electron half reaction relevant to the discharge of the sodium metal on the cathode.

(iii) Why a graphite anode is more suitable for this than a steel anode?

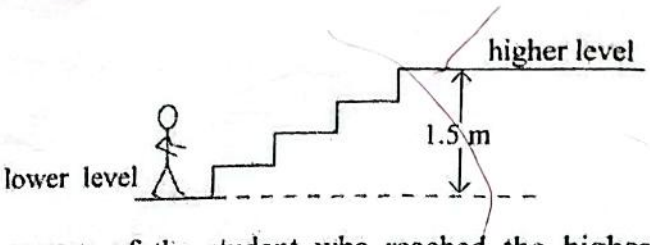
(iv) State **one** application of sodium metal.

(v) Scientist Humphry Davy discovered sodium metal by electrolysing fused sodium hydroxide. Write the ion-electron half reaction that occurred on the anode here. (Hint: Recall electrolysis of acidulated water.)

(20 marks)

(6)	(A)	(i)		increasing surface area of reactants / increasing rate of the reaction	01
		(ii)		X - CaO *(01 mark)* Y - CO_2 *(01 mark)* Z - CO *(01 mark)*	03
		(iii)		5 / SiO_2 + X → $CaSiO_3$ / SiO2 + CaO → $CaSiO_3$	01
		(iv)		Preventing (extracted) iron from coming into contact with air / oxygen OR preventing oxidation of iron	01
		(v)		Amount of Fe_2O_3 required to get 2 mol of Fe = 1 mol Mass (parts by weight) of Fe2O3 required to obtain 112 p.b.w. of Fe = $\frac{160}{112} \times 70$ (ton) OR = 100 (ton) *(for correct fraction or final answer 01 mark)*	02
		(vi)		CO_2 / CO *(01 mark)* CO_2 - increasing global warming / CO - poisonous gas. For the correct effect of the gas *(01 mark)*	02
		(vii)	(a)	1/10 or 0.1	01
			(b)	Dissolve in a (dilute) acid *(01 mark)* and filter *(01 mark)*	02
		(viii)		Recycling / Minimizing corrosion *(award marks for methods which retard corrosion)*	01
		(ix)		Sodium is a very reactive metal or it is located much above in the activity series	01
	(B)	(i)	(a)	To make the ions mobile / because solid sodium chloride doesn't conduct electricity	01
		(ii)		$Na^+(l) + e \longrightarrow Na(l) / Na(s)$	01
		(iii)		because graphite doesn't react with chorine / iron reacts with chorine / graphite is an inert electrode	01
		(iv)		• to extract gold / silver • to produce sodium amalgam • to extract some metals • to produce dyes such as indigo • for sodium lamps • as a coolant in nuclear reactors	01
		(v)		$4\,OH^-(aq) \longrightarrow 2H_2O(l) + O_2(g) + 4e$ *(award marks even though the state symbols are missing)*	01
				Total Marks	20

7. (*A*) A student, mass 40 kg staying at a lower level in the school premises climbs a flight of steps of 1.5 m vertical height and enters a building at a higher level.



(i) How much is the increase in the potential energy of the student who reached the higher level from the lower level? (Assume $g = 10\ m\ s^{-2}$).

(ii) How much is the amount of work done by the student here?

(iii) If the student took 4 s to climb the steps, what is the power of the student in climbing the steps?

(*B*) A uniform wooden block of mass 1 kg is kept at rest on a rough, horizontal table as shown in Figure (1).

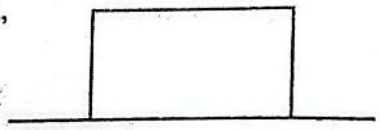


Figure (1)

(i) (a) Under how many forces does the wooden block stay at equilibrium?

(b) Name what those forces are.

(c) Copy Figure (1) above in your answer script and mark those forces in it.

(d) What is the magnitude of each of those forces?

(ii) Another identical wooden block is kept on the above wooden block as shown in Figure (2).

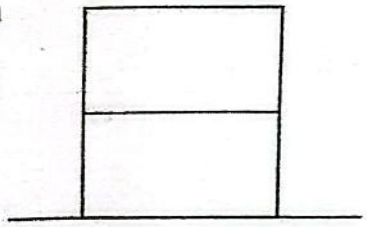
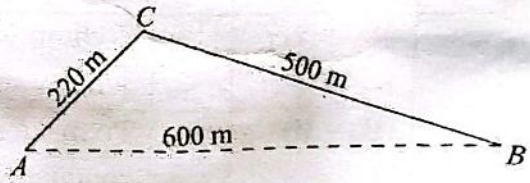


Figure (2)

(a) Of the instances shown in Figures (1) and (2), in which instance is the limiting frictional force between the surface of the table and the wooden block is greater?

(b) Explain the reason for your answer for part (ii) (a) above.

(*C*) *AC* and *CB* shown in the figure are two rectilinear (straight line) roads. Their lengths are 220 m and 500 m respectively. The shortest distance between the places *A* and *B* is 600 m.



A motor car starts from the state of rest at *A*, moves along the roads *AC* and *CB* and comes to rest at *B*. It took 120 seconds for this motion. Taking the motion of the car into consideration, calculate the following.

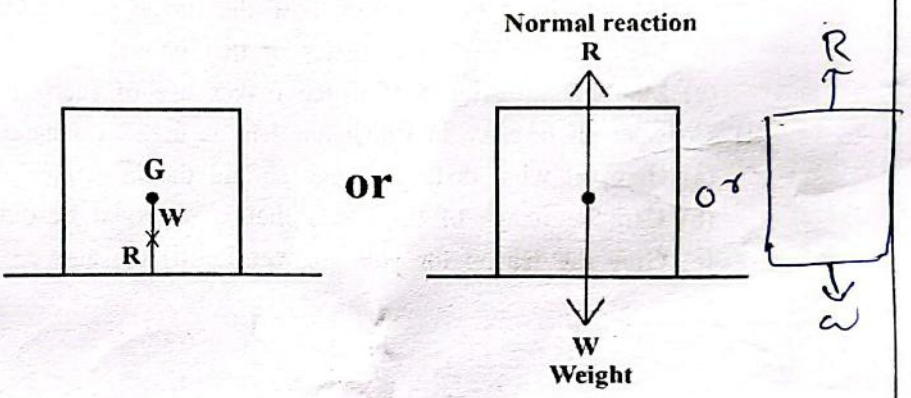
(i) The distance travelled by the car

(ii) Average speed of the car

(iii) Displacement of the car

(iv) Average velocity of the car

(20 marks)

(7)	(A)	(i)		Potential energy = mgh $= 40 \times 10 \times 1.5$ $= 600\ J$ / kgm^2s^{-2} for equation or substitution ***(01 mark)***;for the final answer***(01 mark)***	**02**
		(ii)		600(J)	**01**
		(iii)		Power = Work / Time $= \frac{600J}{4\ s}$ $= 150\ (Js^{-1})$ / (W) for equation or substitution ***(01 mark)***;for the final answer***(01 mark)***	**02**
	(B)	(i)	(a)	two (02) forces	**01**
			(b)	Weight of the block of wood and normal reaction / W & R.	**02**
			(c)		**02**
			(d)	W = 10 (N) , R = 10 (N) or 10 (N) each	**01**
		(ii)	(a)	figure 2 / at instance 2	**01**
			(b)	increase in normal reaction	**02/00**
	(C)	(i)		720 (m)	**01**
		(ii)		$\frac{720\ (m)}{120\ (s)}$ for equation or substitution ***(01 mark)*** $= 6\ (ms^{-1})$ for final answer ***(01 mark)***	**02**
		(iii)		600 (m)	**01**
		(iv)		$\frac{600\ (m)}{120\ (s)}$ for equation or substitution ***(01 mark)*** $= 5\ (ms^{-1})$ for final answer ***(01 mark)***	**02**
				Total Marks	**20**

8. (*A*) (i) A group of students going on a field trip found an animal with the following characteristics.

- has an exoskeleton in the body
- has jointed limbs
- the body is segmented and those segments have joined to form tagmata

Name the following taxa to which this animal belongs.

(a) Domain (b) Kingdom (c) Phylum

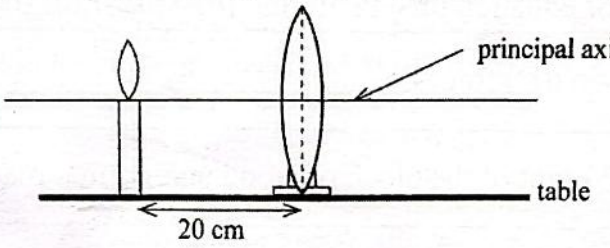
(ii) (a) What is the invertebrate phylum which shows closest relationship to phylum chordata?

(b) State the following characteristics of the animals of that phylum.

I. living environment II. symmetry III. method of locomotion

(iii) Of vertebrates, what are the classes to which cold-blooded animals belong?

(*B*) The focal length of a convex lens is 15 cm. The lens is mounted on a stand, kept on the laboratory table and at a distance of 20 cm a lighted candle is placed in front of it.



(i) (a) Indicate by a ray diagram how the image of the candle flame is formed.

(b) Mention **three** characteristics of that image.

(c) Mention an equipment which makes use of such an image.

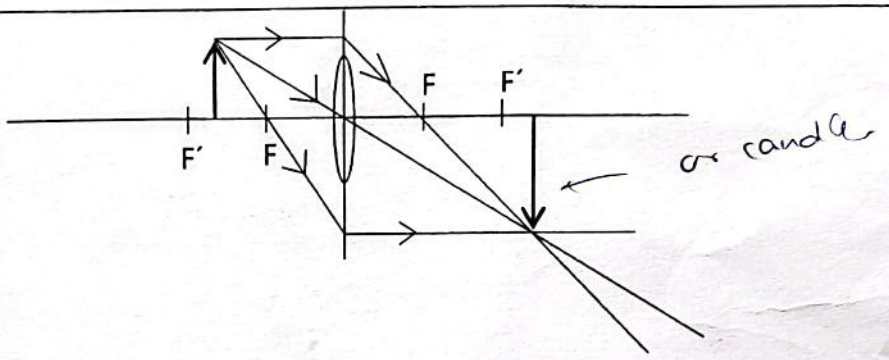
(ii) Consider an instance in which this lens is used as a hand lens to observe a small insect.

(a) Here, at what distance range should the insect be placed from the lens?

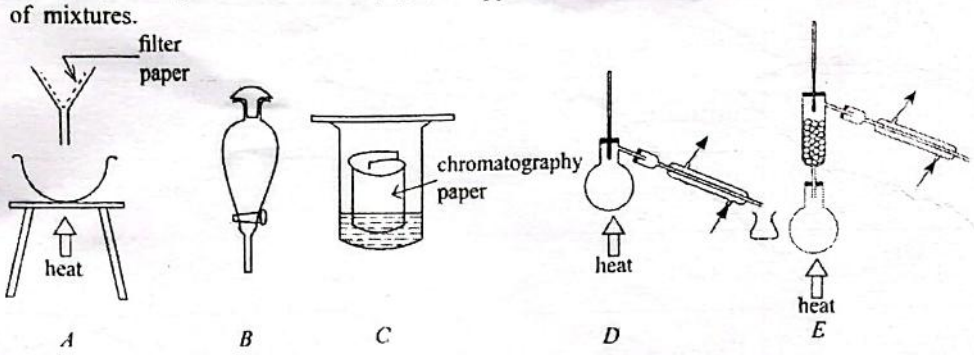
(b) Can the image of the insect that is observed be obtained on a screen?

(c) Give the reason for your answer in (ii) (b) above.

(20 marks)

(8)	(A)	(i)	(a)	eukarya	01
			(b)	animalia	01
			(c)	arthropoda	01
		(ii)	(a)	echinodermata	01
			(b)	living environment - sea water / brine *(01 mark)* symmetry - (Penta) radial *(01 mark)* method of locomotion - by tube feet / swimming *(01 mark)*	03
		(iii)		Pisces, Amphibia , Reptilia *(01 mark × 3)*	03
	(B)	(i)	(a)	 for any two correct rays *(02 marks)* for construction of the image *(01 mark)* (away from F')	03
			(b)	Real Inverted Magnified Formed away from ~~F~~ 2F' *(01 × 3)*	03
			(c)	Projectors (OHP / slide projector) Light microscope Give marks for other suitable answers also spacial telescope.	01
		(ii)	(a)	Up to 15cm from the lens / at a distance less than the focal length / up to 15 cm from the optical centre (c)	01
			(b)	No	01
			(c)	Because the image is virtual / reflected rays do not meet / image is for same side of the object	01
				Total Marks	20

9. (*A*) Shown by the figures below are five sets of apparatus that can be used to separate the components of mixtures.



(i) Identify the set of apparatus that can be used for each of the following need of separation and write the letter that corresponds to it. (The same letter can be used more than once.)
(a) Obtaining pure crystals of salt from a mixture of salt and sand
(b) Identifying the pigments of a food colouring separately
(c) Extracting iodine dissolved in water into the liquid cyclohexane which is immiscible with water
(d) Obtaining miscible ethanol (boiling point 78 °C) and acetic acid (boiling point 118 °C) separately from a solution of them
(e) Separating the components of chlorophyll

(ii) (a) Why is acetic acid known as a weak acid?
(b) How do you experimentally verify that ethanol separated by the method you stated in part (i) (d) above does **not** contain acetic acid?

(iii) Under special conditions acetic acid reacts with ethanol according to the following chemical equation.

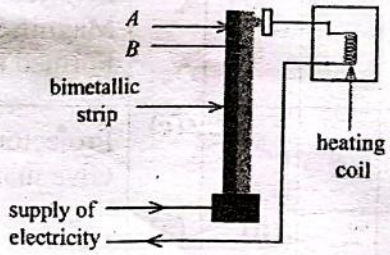
$$CH_3COOH + C_2H_5OH \longrightarrow CH_3COOC_2H_5 + x$$

What can be the product indicated by the letter x here?

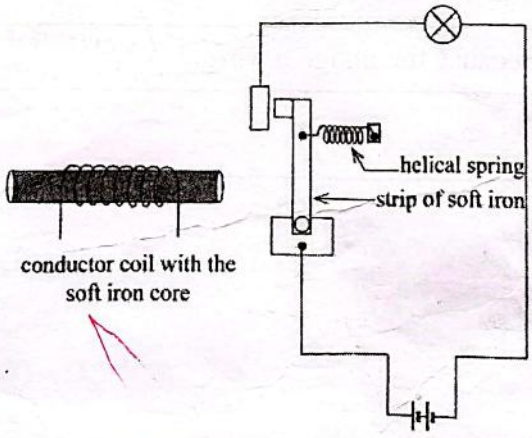
(*B*) Heating effect and magnetic effect are two physical effects resulted when an electric current flows through a conductor.

(i) Describe briefly and separately what is
(a) heating effect and
(b) magnetic effect
of an electric current.

(ii) The figure illustrates an arrangement installed to disconnect the electric current when the temperature of an electrical device producing heat rises beyond a certain value.
(a) Of the two metals labelled *A* and *B* from which the bimetallic strip is made, which metal should expand more?
(b) Explain how the electric current gets disconnected by this arrangement.



(iii) The following figure illustrates a circuit constructed to close when an electric current flows through the conductor coil with a soft iron core and open when no current flows through the coil.



Explain how the circuit is closed when a current flows through the coil and the circuit opens when no current flows through it.

(20 marks)

(9)	(A)	(i)	(a)	A	01
			(b)	C	01
			(c)	B	01
			(d)	E	01
			(e)	C	01
		(ii)	(a)	Because it doesn't ionize fully in water / it partially ionized in aqueous solution	02
			(b)	When ethanol is tested with a blue litmus paper, it doesn't turn red/ when tested with a pH paper, colour corresponding to pH less than 7 is not given / when methyl orange indicator is added it doesn't turn red/ no effervescence is observed when a carbonate is added ***for test - (01 mark) ; for observation - (01 mark)***	02
		(iii)		water / H_2O	01
	(B)	(i)	(a)	Thermal effect - Conversion of electrical energy into heat due to resistance when an electric current flows.	02
			(b)	Magnetic effect - Creation of a magnetic field / area / effect around a conductor carrying an electric current	01
		(ii)	(a)	metal B	01
			(b)	When temperature increases the metal strip bends to the left because it expands. Then the circuit get disconnected and flow of the current ceases. ***(Give marks for the correct idea.)***	02
		(iii)		When the circuit closes - When the current flows through the coil, it becomes an electromagnet. Then it attract the soft iron strip. Thus, the circuit is completed and the current flows.***(02 mark)*** When the circuit opens - When the current ceases to flow through the coil, it is demagnetized. Then the spring pulls the strip of iron breaking the circuit, so the current stops flowing. ***(02 mark)***	04
				Total Marks	20