OL/2021(2022)/34/E-I

34 E I

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

විද්‍යාව I
விஞ்ஞானம் I
Science I

පැය එකයි
ஒரு மணித்தியாலம்
One hour

Note :

* *Answer **all** questions.*
* *In each of the questions **1** to **40**, pick one of the alternatives* (1), (2), (3), (4) *which you consider is **correct** or **most appropriate**.*
* ***Mark a cross** (×) **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 organizational level does the human heart belong?
(1) cell (2) tissue (3) organ (4) system

2. The hydrocarbons contained in LP gas as its major components are
(1) methane and ethane. (2) propane and butane.
(3) butane and pentane. (4) propane and pentane.

3. What is the unit of the amount of work?
(1) kg m s^{-1} (2) kg m s^{-2} (3) kg m^{-1} s^{-1} (4) kg m^{2} s^{-2}

4. Which of the following is **not** a characteristic of the cardiac muscle tissue?
(1) cells being mononuclear (2) occurrence of intercalated discs
(3) cells being branched (4) acting voluntarily

5. A seed observed by a student during a field study is shown in the diagram. This seed is dispersed by

(1) animals. (2) water.
(3) wind. (4) explosion.

6. Which of the following quantity increases uniformly in an object moving with a constant acceleration?
(1) distance (2) displacement (3) velocity (4) retardation

7. Which of the following is equal in $^{40}_{19}K$ and $^{40}_{20}Ca$ atoms?
(1) number of electrons
(2) number of neutrons
(3) sum of the number of electrons and protons
(4) sum of the number of protons and neutrons

8. Which property of water causes water to be used as a cooling agent to remove excessive heat generated in an automobile engine?
(1) having a high specific heat capacity (2) having a high boiling point
(3) being a colourless liquid (4) having a high density

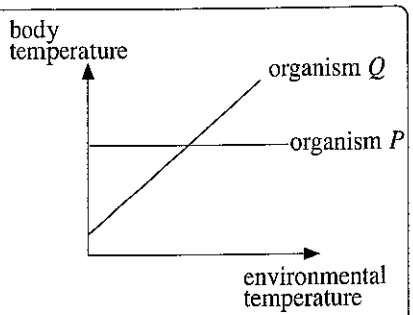
9. In the process of digestion of food, bile necessary for the emulsification of lipids is produced in the
(1) gall bladder. (2) liver. (3) duodenum. (4) pancreas.

10. What is the essential element for the production of thyroxine hormone in the thyroid gland?
(1) sodium (2) phosphorus (3) calcium (4) iodine

11. How much is the mass of NaCl contained in 100 cm^3 of a sodium chloride solution of concentration 1.0 mol dm^{-3}? (Na = 23, Cl = 35.5)
(1) 585 g (2) 58.5 g (3) 5.85 g (4) 0.585 g

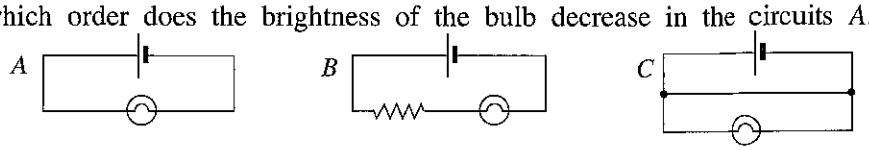
[*See page two*

23. The graphs P and Q respectively indicate how the body temperature of the two organisms P and Q varies with the temperature of the environment. The organisms P and Q respectively can be



(1) ox and bat.
(2) fowl and tortoise.
(3) elephant and duck.
(4) frog and Thilapia.

24. In which order does the brightness of the bulb decrease in the circuits A, B and C?



(1) $A > B > C$ (2) $A > C > B$ (3) $B > C > A$ (4) $C > A > B$

25. Some information regarding an element are as follows.

- Has several allotropic forms.
- One allotropic form conducts electricity.

This element is

(1) carbon. (2) oxygen. (3) sulphur. (4) iron.

26. Some functions of the human brain are given below.

A - reception of senses
B - maintaining the balance of the body
C - controlling the rate of heart beat

Of the above, cerebellum controls

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

27. Consider the following statements.

A - The rate of a reaction increases when the temperature increases.
B - The kinetic energy of reactant particles increases when the temperature increases.

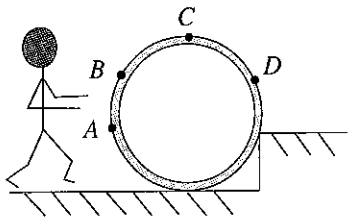
Of these

(1) both statements A and B are true.
(2) statement A is true and statement B is false.
(3) both statements A and B are false.
(4) statement A is false and statement B is true.

28. Which of the following phenomena **cannot be** explained by the Archimedes principle?

(1) a ship cruising in the sea sinking more when entering a river
(2) a balloon filled with helium gas moving upwards through air
(3) floating of sunk orange seeds in a glass of orange juice when dissolving sugar
(4) lifting a large mass by a hydraulic jack by applying a small force

29. The diagram shows a cross section of a cylindrical concrete ring kept on a flight of steps. Indicated as A, B, C and D are four points at which force can be applied by a man to roll it to the upper level. What is the point at which force can be applied on the cylinder in a suitable direction to roll it up with a lowest force?



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

30. When thin iron wool is heated, it instantly burns. But though an iron nail is heated till red hot, it does not undergo a considerable change. What conclusion can be drawn from these observations?

(1) Iron wool acts as a catalyst.
(2) Iron wool and iron nail undergo reactions different from each other.
(3) The composition of iron wool and iron nail is different from each other.
(4) The rate of a reaction depends on the physical nature of the reactants.

31. In 2011, the number of elephants in Sri Lanka was 5879. What is the most suitable biospherical organizational level to denominate that number of elephants?

(1) species (2) population (3) community (4) eco-system

[*See page four*

OL/2021(2022)/34/E-II

34 | E | II

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

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

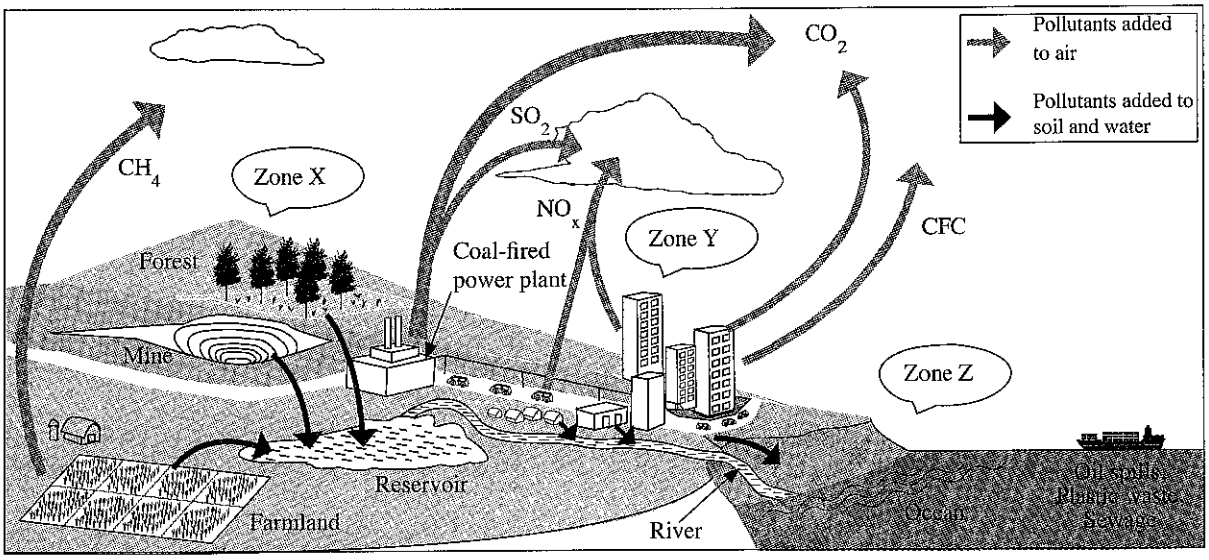
Use additional reading time to go through the question paper, select the questions you will answer and decide which of them you will prioritise.

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 hand over.***

Part A

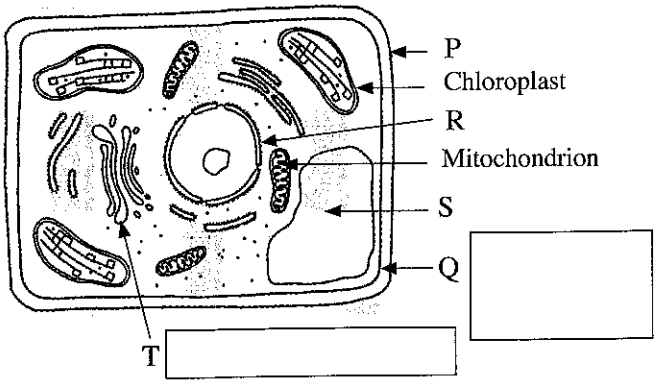
1. (*A*) The following diagram briefly indicates the ways by which air, soil and water are polluted.



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

	Statement	Example
(i)	The gas contributing most to the increase in global warming	.....
(ii)	The main source that releases the components causing eutrophication in the reservoir	.....
(iii)	Gaseous organic compound that depletes the ozone layer	.....
(iv)	The zone most prone to have photochemical smog	.....
(v)	The source producing gases which cause acid rains	.....
(vi)	The source that adds ground heavy metals to topsoil	.....
(vii)	The pollutant accumulated in living organisms through food chains and subjected to the minimum chemical digestion in the digestive system	.....

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



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

.....

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

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

.....

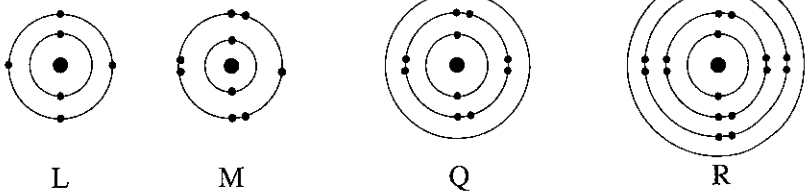
(iv) State the function carried out by the following organelles.

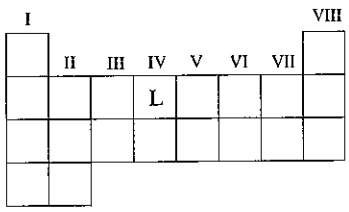
(a) chloroplast .....

(b) mitochondrion .....

15

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





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

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

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

.....

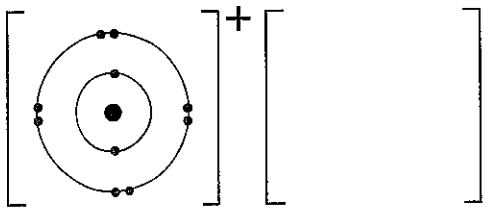
(iv) Of L and M, which element is higher in electronegativity? .....

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

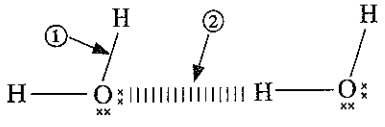
(vi) State the acidic/basic nature of the following oxides formed by L and Q.

LO_2 : ..... Q_2O : .....

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



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



(i) The bond type indicated by the arrow ① is known as ..... and the bond type indicated by the arrow ② is known as .....

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

(iii) A very small ..... charge lies on the hydrogen atoms in the water molecules.

15

[See page four

Part B

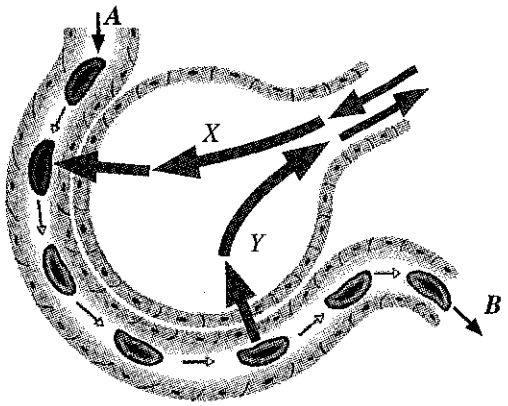
● Answer only **three** questions from the questions No. **5, 6, 7, 8** and **9**.

5. (*A*) Respiration is a biological process. The system organized for it is called the respiratory system.

(i) Write **two** changes occurring in inhaled air when it passes through the nasal cavity of man.

(ii) Name the **two** structures which contain muscles contributing to increase the volume of the thoracic cavity during inspiration.

(iii) A sketch of an alveolus in which gas exchange takes place in the respiration of man is given below. Indicated as *X* and *Y* in the figure are two types of gases that exchange in the alveolus.



(a) Name gas *X* and gas *Y* in respective order.

(b) By what process does gas exchange occur between alveoli and blood capillaries?

(c) What is the main difference between the blood that enters the capillary at ***A*** and the blood that leaves the capillary at ***B***?

(d) State an adaptation of alveoli to make the gas exchange efficient.

(e) By what name is the ailing condition of gradual destruction of alveoli due to accumulation of compounds based on silica in alveoli known?

(*B*) The process of producing food in green plants is called photosynthesis.

(i) Write the energy transformation occurring in the process of photosynthesis.

(ii) State how atmospheric carbon dioxide necessary for photosynthesis enters plant leaves.

(iii) "It is not possible to show water is an essential factor for photosynthesis by a simple laboratory experiment." Do you agree with this statement? Give a reason to validate your answer.

(iv) The water essential for photosynthesis is absorbed by roots and transported to plant leaves through the xylem tissue.

(a) Of the cells that form the xylem tissue, what are the types of cells that contribute to transport water?

(b) In addition to water, name another substance that is transported through the xylem tissue.

(c) In addition to transport function, state the other function carried out by the xylem tissue.

(d) Describe briefly how the cells in the xylem tissue are adapted to fulfil the function you stated in (c) above.

(20 marks)

6. (*A*) Sodium hydroxide (NaOH) is a basic chemical compound. It acts as a strong base in an aqueous solution.

(i) Explain what is a base according to the way it behaves in an aqueous solution.

(ii) Why is sodium hydroxide called a strong base?

(iii) Name an industrial use of sodium hydroxide.

(iv) For a laboratory experiment, a student prepared 500 cm^3 of a sodium hydroxide solution with concentration of 1.00 mol dm^{-3}.

(a) Name **two** laboratory glassware required to prepare the above solution.

(b) How much is the mass of sodium hydroxide required to prepare the above solution? (H = 1, O = 16, Na = 23)

(*B*) Water of mass 1 kg is contained in an electric kettle used in a house.

(i) What is the amount of heat required to raise the temperature of 1 kg of water from 20 °C to 100 °C? (**Specific heat capacity** of water is 4200 J kg^{-1} $°C^{-1}$.)

(ii) Find the amount of heat absorbed by the kettle when the temperature of the water in the kettle was increased from 20 °C to 100 °C. (**Heat capacity** of the kettle is 160 J $°C^{-1}$.)

(iii) The power of the heating coil used to heat the kettle is 1000 W. What is the time taken to heat the water in the kettle from 20 °C to 100 °C?

(iv) The following measures have been taken to prevent the loss of heat from the kettle to the outer environment.

(a) closing the kettle with a lid

(b) polishing the outer surface of the kettle well

State the method of heat transfer controlled by each of the above measures.

(20 marks)

8. (*A*) Some phenomena faced and identified by a farmer maintaining a mixed crop cultivation are given below. Answer the questions asked on them.

(i) The passion fruit cultivation produces flowers but does not set fruits. Therefore the flowers need to be artificially pollinated. How are the passion fruit flowers artificially pollinated?

(ii) Cocoyam (gahala/shembu) plants grow again after a certain period of time following the death of their aerial parts. What is the term used to describe this process by which the Cocoyam plants ensure their survival?

(iii) In the farmland, one bush of banana trees gives a greater yield. The plants in that bush are highly resistant to diseases. Name an artificial vegetative propagation method suitable to obtain a large number of banana plants with those traits at once.

(iv) The farmer intends to use a woodapple plant growing in the farmland as the stock and graft an orange twig to it. State **two** characteristics of the woodapple plant which would have caused its selection as the stock.

(v) The farmer cultivated in the farmland a garden pea plant which was rare in the area where his farmland is situated. That garden pea plant bears round seeds. A majority of the new pea plants grown from that garden pea plant bears round seeds. But the rest bears wrinkled seeds. Based on your knowledge in genetics explain this phenomenon using the Punnett square.

(*B*) In Figure 1, ***AB*** and ***CD*** indicate two metal rails. ***PQ*** is a conductor rod which can be slid on the two rails. The resistance of the rails and the rod are negligibly small. A uniform magnetic field is applied into the plane perpendicular to it on which the metal rails are placed. When the rod ***PQ*** is moved to right, an electric current is induced in it.

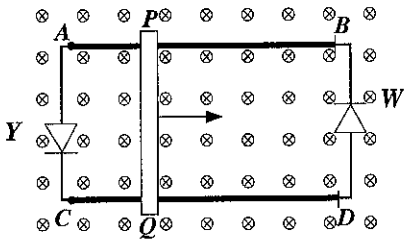


Figure 1

(i) Name the rule which can be used to decide the direction of the induced current in ***PQ***.

(ii) According to the rule stated in (i) above, does the current flow from ***P*** to ***Q*** or from ***Q*** to ***P***?

(iii) Due to the induced current in ***PQ***, only one of the LEDs labelled ***Y*** and ***W*** lights.

(a) What is the LED that lights?

(b) State the reason why the other LED does not light.

(iv) Figure 2 shows how a battery and a switch are connected between ***A*** and ***C*** after removing the two LEDs in Figure 1.

(a) State an observation made when the switch in the circuit is closed (put on).

(b) Name a device made by using the phenomenon associated with the observation mentioned in (iv) (a) above.

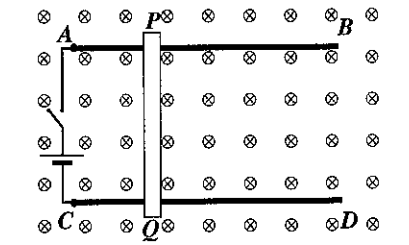


Figure 2

(20 marks)

[See page eight