Ministry of Education, Higher Education and Vocational Education
Science Branch

34 - E - II

Grade 11 | **G.C.E (O/L) Supportive Test-2024(2025)**

Science I | **One hour**

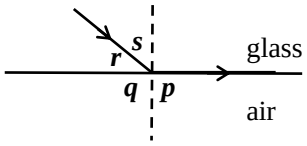
Instructions:
- Answer all the questions.
- In each of the questions 1 to 40, pick one of the alternatives (1), (2), (3), (4) which you consider is correct or most appropriate. (g = **10 m s^{-2}**)

1. What is the international standard unit (SI) of measuring specific heat capacity?
(1) J S^{-1} (2) J K^{-1} (3) J kg^{-1} K^{-1} (4) J kg^{-1} $^0C^{-1}$

2. What is the correct answer which indicates the scientific name of mango plant?
(1) *mangifera Indica* (2) *Mangifera indica* (3) mangifera indica (4) MANGIFERA INDICA

3. The information that cannot be determined from the location of an element in the periodic table is,
(1) Atomic number (2) Electronic configuration
(3) Mass number (4) Number of energy levels

4. Which letter represents the critical angle in the given diagram?
(1) ***p*** (2) ***q***
(3) ***r*** (4) ***s***

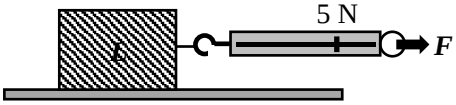


5. ..... is a photoautotrophic organism.
(1) Chlamydomonas (2) Yeast (3) Sea anemone (4) Amoeba

6. The two vegetative propagation parts of plants ***A*** and ***B*** shown in the figure respectively are.
(1) Rhizome and Stem tuber (2) Corm and Stem tuber
(3) Rhizome and Bulbs (4) Corm and Bulbs

A ***B***

7. The figure shows how a horizontal force ***F*** is applied to a wooden block ***L*** placed on a rough surface. When the force ***F*** is 5 N, the wooden block does not move. The correct statement regarding the figure,
(1) Weight of the wooden block is 5 N.
(2) Static frictional force is 5 N.
(3) Resultant force towards ***F*** is 5 N.
(4) Limiting frictional force is less than 5 N.



8. The tissue that provides rigidity to the plant body is,
(1) Xylem (2) Phloem (3) Cambium (4) Parenchyma

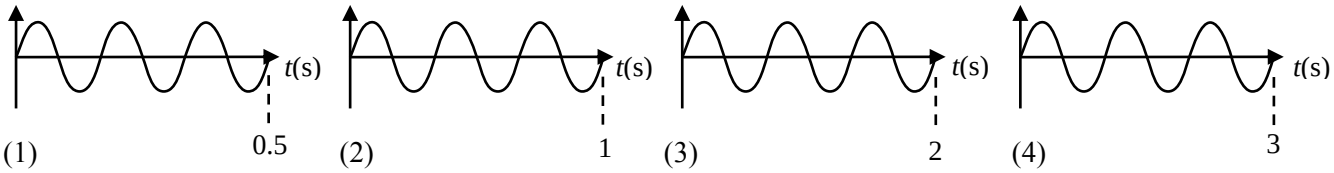
9. The reaction that occurs when a piece of zinc is put in to a diluted hydrochloric acid solution is,
(1) Combination reaction (2) Decomposition reaction.
(3) Single displacement reaction (4) Double displacement reaction

10. What hormone does the opposite function of the Glucagon hormone?
(1) Adrenalin (2) Calcitonin (3) Thyroxin (4) Insulin

11. What is the answer with molecules that have single bonds, double bonds, and triple bonds respectively between atoms?
(1) N_2 , CO_2, HCl (2) CO_2, HCl, N_2 (3) HCl , CO_2, N_2 (4) HCl , N_2 , CO_2

12. A transformer with 100% efficiency supplies 220 V and a current of 0.5 A to the primary coil. If a potential difference of 11 V is applied to the secondary coil, what is the current flowing in that coil?
(1) 0.025 A (2) 0.5 A (3) 10 A (4) 40 A

13. Which of the following waves has a frequency of 1.5 Hz?

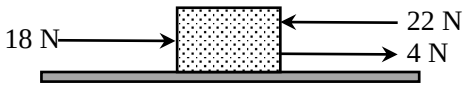


(1) (2) (3) (4)

14. What is the answer with membrane less, single membrane and double membrane organelles in a cell respectively?

(1) Ribosomes, Golgi bodies and Chloroplast.
(2) Ribosomes, Nucleus and Chloroplast.
(3) Nucleus, Golgi body and Mitochondria.
(4) Mitochondria , Ribosome and Nucleus.

15. The figure given below shows how three horizontal forces are acting on an object. What is the magnitude of the resultant force acting on that object?



(1) 0 N
(2) 18 N
(3) 22 N
(4) 36 N

16. Which of the following is not a product of respiration in plants?

(1) Ethyl alcohol (2) Carbon dioxide (3) Lactic acid (4) ATP

17. How many H atoms are there in 16 g of methanol (CH_3OH)? (CH_3OH = 32 g mol^{-1})

(1) $2 \times 6.022 \times 10^{23}$ (2) $4 \times 6.022 \times 10^{23}$ (3) $16 \times 6.022 \times 10^{23}$ (4) $32 \times 6.022 \times 10^{23}$

18. Excretion of waste products produced during metabolism from the body is known as

(1) Excretion
(2) Coordination
(3) Irritability
(4) Respiration

19. In which of the following situations does a couple of force does not act?

(1) Turning the key to lock the door
(2) Using a screwdriver to fix a screw.
(3) Twisting a cap of a bottle
(4) Pedalling a bicycle

20. Which molecule has a central atom with a noble gas configuration?

(1) $BeCl_2$ (2) $AlCl_3$ (3) NH_3 (4) PCl_5

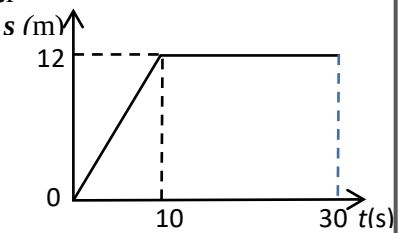
21. The colour rings of a resistor are red, purple, brown and silver respectively. What is the resistance value of the resistor?
(Brown = 1, Red = 2, Purple = 7)

(1) 172 Ω (2) 270 Ω (3) 271 Ω (4) 1700 Ω

22. Which of the following pairs of substances form a homogeneous mixture when mixed together?

(1) Ethanol and Water
(2) Water and Carbon tetrachloride
(3) Carbon tetrachloride and Ethanol
(4) Coconut oil and Water

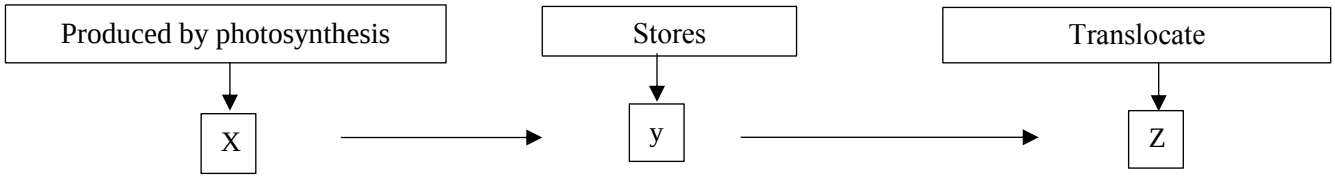
23. The displacement-time graph related to the motion of an object is shown below. Consider the following statements regarding it.



A - During the first 10 s, the object has moved with a uniform velocity.
B - The object remains at rest within 10 s to 30 s.
C - The displacement of the object in 30 s is 300 m.
Which of the above statements is correct?

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

24. Given below is part of a flowchart prepared by a student.



Which answer shows the correct carbohydrate corresponding for X, Y and Z respectively from the following?

(1) glucose, sucrose and starch.
(2) glucose, starch and sucrose.
(3) sucrose, starch and glucose.
(4) starch, glucose and sucrose.

25. Which answer shows the ascending order of the mass of the element in an organism?

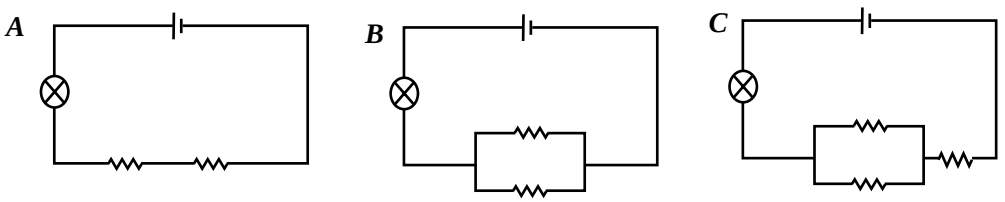
(1) Carbon < Hydrogen < Oxygen (2) Oxygen < Hydrogen < Carbon

(3) Oxygen < Carbon < Hydrogen (4) Hydrogen < Carbon < Oxygen

26. Given below is the information regarding four players ***P, Q, R,*** and ***S*** in a running event. Which player has the highest momentum?

	Player	Mass of the Player	Velocity
(1)	***P***	*m*	4 m s^{-1}
(2)	***Q***	*m*	9 m s^{-1}
(3)	***R***	2 *m*	4 m s^{-1}
(4)	***S***	2 *m*	9 m s^{-1}

27. Given below are three circuits A, B and C which are used to light three filamented bulbs. Resistance of each resistor is 4 Ω.



What are the circuits with the bulbs with highest and the lowest brightness respectively,

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

28. Given below are the observations of three solutions in an acid base identification.

A – pH paper turns into purple.

B – Phenolphthalein remains colorless.

C – Red litmus turns blue.

The basic solution out of the three solutions is,

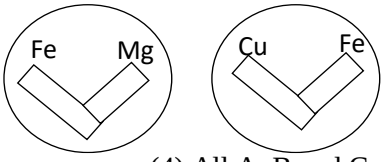
(1) Only A and B. (2) Only A and C. (3) Only B and C. (4) All A, B and C.

29. The figure shows two pairs of metals placed in an agar medium mixed with potassium Ferricyanide and phenolphthalein. Given below are some statements of a student regarding the observations after a few hours.

A - pink color near Cu metal.

B - Blue colour near Fe in both setups.

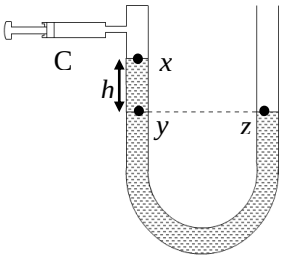
C - No colour change near Mg.



Which of the statements made by the student is true?

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

30. The air pressure in the syringe C shown in the setup in the image is,



(1) Equal to the pressure at ***z***.

(2) Equal to the pressure at ***z*** + pressure at ***y***.

(3) Equal to the pressure at ***z*** + pressure exerted by liquid column *h*.

(4) Equal to the pressure at ***z*** - pressure exerted by liquid column *h*.

31. A plier dropped by a mechanic at the top of a transmission tower 45 m high, falls vertically down freely. What is the velocity of the plier at the moment it touches the ground? ($g = 10$ m s^{-2})

(1) 3 m s^{-1} (2) 4.5 m s^{-1} (3) 30 m s^{-1} (4) 45 m s^{-1}

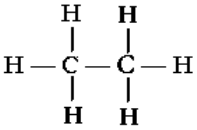
32. The Lewis structure of the molecule ethane (C_2H_6) is shown below. What characteristic confirms that ethane is an alkane?

(1) Presence of single bonds between Carbon and Hydrogen atoms.

(2) Presence of single bonds between Carbon atoms.

(3) Consisting only carbon and hydrogen atoms.

(4) The ratio of C : H is 1 : 3.

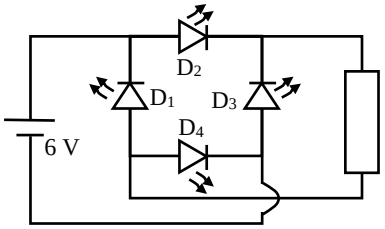


33. Three solutions A, B and C prepared by dissolving different masses of NaOH in distilled water have given in the table. (NaOH =40 g mol^{-1}) What is the answer with the ascending order of concentration of solutions?

	A	B	C
Mass	10 g	20 g	40g
Volume	100 cm^3	250 cm^3	600 cm^3

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

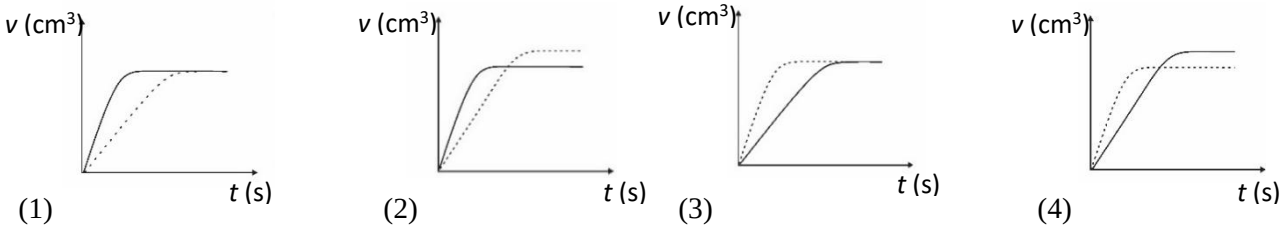
34. Red LEDs are used instead of rectifier diodes in the bridge shown in the picture. Which LEDs light up according to the direction of current flow in the circuit?



(1) D_1 and D_2 (2) D_1 and D_3
(3) D_2 and D_3 (4) D_2 and D_4

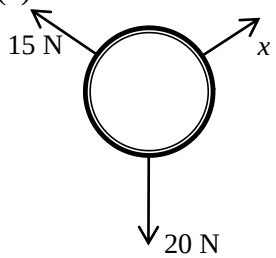
35. In order to study how the physical nature of the reactants affects the reaction rate, 2 g of Zn sheets and Zn pieces are reacted separately with 1 mol dm^{-3} concentrated HCl acid. Which of the following is the graph that correctly shows how the volume of the collected air (v) varies with time (t) at each moment?

-------- Zn sheet —— Zn pieces



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

36. The figure below shows how a ring is in equilibrium under three co-planer forces. The resultant of 15 N and 20 N is 14 N. What is the magnitude of the x force?



(1) 35 N (2) 21 N
(3) 14 N (4) 5 N

37. Given below are some of the behaviors of a certain person.

- Travels to workplace in his personal car.
- Use the elevator whenever possible.
- Snacks are eaten in addition to the main meal.

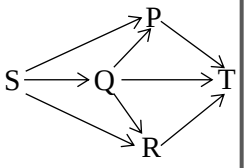
Which of the following non-communicable disease is he at risk of most likely to develop?

(1)Diabetic (2) Cancer (3) Chronic Kidney Disease (4) Hypotension

38. Given below are some animals that live near a garbage dump. Among them, who is the animal with the highest concentration of microplastic particles in its blood?

(1) Rat (2) Frog (3) Snake (4) Hawk

39. A food web in an ecosystem is given in the figure below. Which animal population density decreases rapidly when T is removed from the ecosystem?



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

40. Below are some measures followed by people in a particular household

A - Using banana leaves instead of polythene to make lunch parcels.
B - Using food scraps from home to make compost.
C - Using the polythene bag brought from the store to bring the goods on a later day.

Which of the following is the correct 4R principle answer for the above actions?

	A	B	C
(1)	Replace	Recycle	Reuse
(2)	Replace	Reduce	Reuse
(3)	Reduce	Reuse	Recycle
(4)	Recycle	Replace	Reduce

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Ministry of Education, Higher Education and Vocational Education
Science Branch

34-E-II

Grade 11 | **G.C.E (O/L) Supportive Test-2024(2025)**

Science II | **Three Hours**

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

Part A-Structured Essays

1. **(*A*)** A diagram of an urban environment is given below.

(i) Complete the following table by mentioning the environmental crisis and the causative chemical that leads to the phenomena shown as A, B and C in the diagram. (04)

Phenomenon	Environmental crisis	Causative chemical
A	Eutrophication	(a)……
B	(b) ……...	NO
C	(c) ……...	(d) ……..

(ii) State an example of using renewable energy sources using the given diagram.
..... (01)

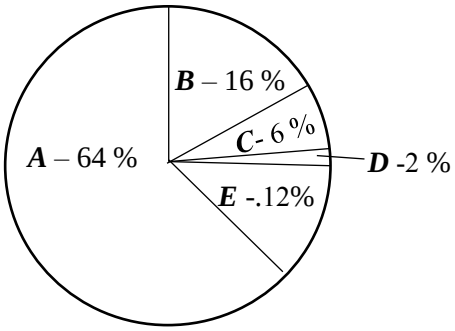
(iii) Mention a strategy adopted in city planning to improve the physical fitness of city dwellers with the help of the given diagram.
..... (01)

(iv) A study revealed that the NO Composition of the air in the city is higher during the daytime than at night. Give a reason for that.
..... (01)

(v) Suggest a strategy to reduce the number of private vehicles entering the city premises.

..... (01)

(*B*) Pie charts (1) and (2) below indicate information related to annual greenhouse gas emissions of a particular country.



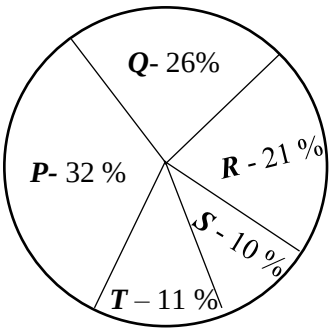
A – **CO_2**

B – **CH_4**

C – **CFC**

D – **NO_x**

E – Other gases



P – Electricity Generation

Q – Transportation

R – Industries

S – Agriculture

T – Other

(1) Gases which are emitted ***(2) Fields of emission of gases***

- Answer the following questions based on the above given pie charts.

(i) Name the greenhouse gas which is mostly emitted here. ..... (01)

(ii) (a) Name the two fields that contribute the most in the emission of greenhouse gases.
..... (01)

(b) Mention the reason why those fields contribute the most.
..... (01)

(iii) Select and write a combustible gas emitted due to agriculture from the pie chart (1).
..... (01)

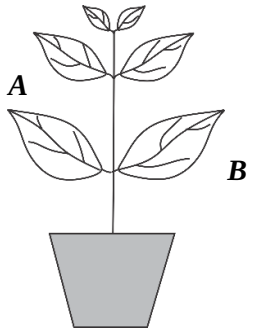
(iv) Name two constituent elements of gases apart from carbon indicated by C in the pie chart (1).
..... (01)

(v) Propose a method to reduce greenhouse gas emissions caused by ***P***.
..... (01)

(vi) Name the main environmental crisis caused by the increase in the concentration of greenhouse gases.
..... (01) 15

2. ***(A)*** A group of students plans an experiment to show that photosynthesis requires carbon dioxide gas. The following setup has been prepared for that.

- **Two** bags of clear polythene, some **KOH**, water, two pieces of thread, A plant placed in the dark for 48 hours.



(i) Name another chemical compound that can be used instead of **KOH** for this activity.
..... (01)

(ii) Here is a picture of the plant placed in the dark for 48 hours.
Complete the setup for the experiment using its leaves ***A*** and ***B*** with the prepared materials. (03)

(iii) State the reason why the plant is kept in the dark for 48 hours?
..... (01)

(iv) A few hours later leaves A and B were separated from the plant and subjected to starch test.

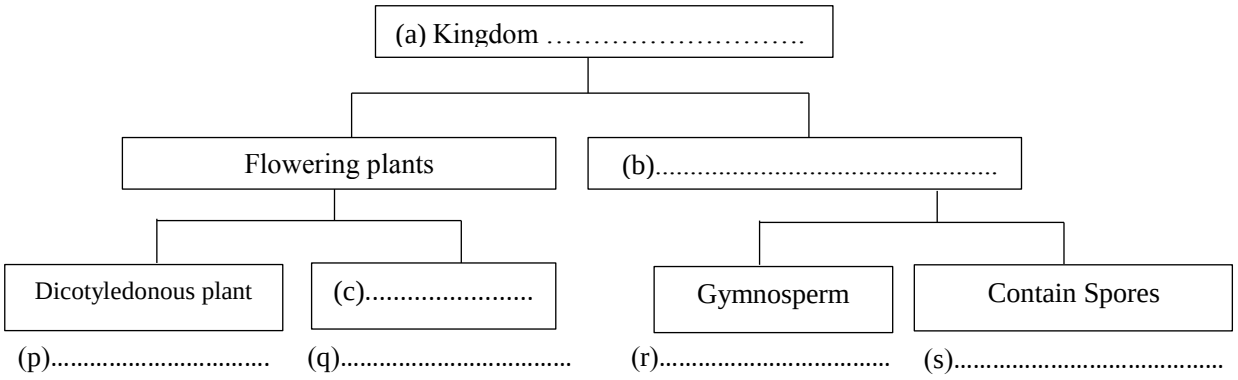
(a) What is the chemical compound used for the starch test?..... (01)

(b) State the color change in each leaf after performing the starch test.

Leaf ***A*** ..... (01)

Leaf ***B*** ..... (01)

(***B***) An incomplete flowchart of plant classification is given below.

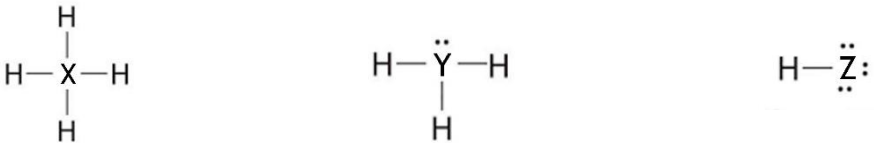


(i) Fill in the blanks (a), (b) and (c) using the relevant words. (03)

(ii) Complete the chart by placing suitable plants from Paddy, Pogonatum, Hibiscus and Pinus for the given spaces (p), (q), (r) and (s). (04)

15

3. ***(A) X, Y*** and ***Z*** are three elements belonging to the second period of the periodic table. (***X, Y*** and ***Z*** are not standard symbols of the elements) The Lewis structures of the covalent compounds they form with hydrogen are shown below.



(i) Choose the elements X, Y and Z corresponding to the properties shown and complete the table.

Property of the element	Element
(a) Forms an atomic lattice	
(b) Highest in electronegativity	
(c) Lowest first ionization energy	
(d) Forms a diatomic molecule with a triple bond	

(04)

(ii) Fill in the blanks of the following sentences.

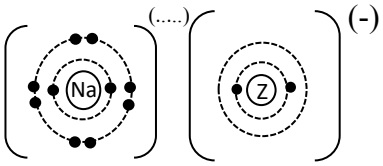
(a) The element ***Y*** belongs to the group ..... of the periodic table.

(b) The electronic configuration of the element ***X*** is .....

(c) Chemical formulae of the compound formed by combining elements ***Y*** and ***Z*** is ……..

(d) The single bond formed between ***H*** and ***Z*** is a …… bond. (04)

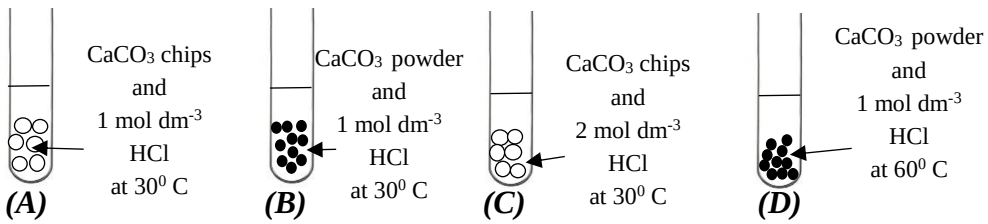
(iii) The diagram below illustrates how ionic bonding occurs between element ***Z*** and sodium metal.



(a) Show the charge on the sodium ion in the space in the figure. (01)

(b) Draw the arrangement of electrons in the outermost layer of the ***Z*** ion. (01)

(***B***) Four sets of apparatus arranged to study the factors affecting the rate of reaction are given below. Equal mass of $CaCO_3$ and equal volume of HCl acid were used in each setup.



(i) Name the pair of setups out of ***A, B, C*** and ***D*** that can be used to show the effect of following factors on the rate of reaction.

(a) Surface area of reactants ..... (01)

(b) Concentration of reactants ..... (01)

(c) Temperature ..... (01)

(ii) Out of ***A, B, C*** and ***D*** in which setup least amount of air bubbles produced per unit time?

…… ..... (01)

(iii) Write a strategy that can be used to keep the temperature mentioned in the test tubes constant during the experiment.

..... (02)

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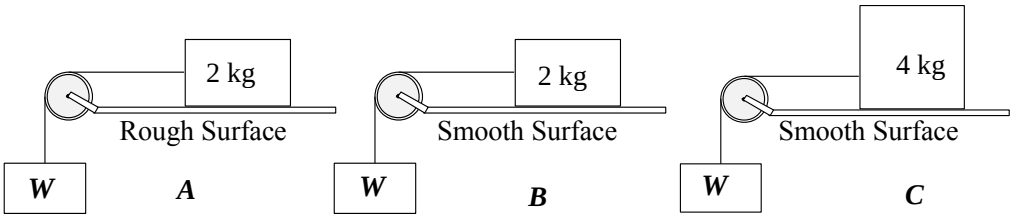
4.(***A***) Setups ***A, B*** and ***C*** in the figures are prepared to examine the factors affecting the magnitude of the limiting frictional force. The following table shows the observations obtained through this activity in two instances.



(i) Given below are two factors that affect friction. Write the English letters of the pair of setups that can be used to test each factor.

Instance	Weight of ***W***	Setup ***A***	Setup ***B***	Setup ***C***
First	2 N	at rest	at rest	at rest
Second	5 N	at rest	moving	at rest

(a) Nature of the contact surface: ..... (01)

(b) Perpendicular reaction: ..... (01)

(ii) Which Newton's law can be used to explain the state of the object in the first instance?

..... (01)

(iii) When object B is moving, the frictional force acting between the contact surfaces belongs to which of the static, limiting and dynamic frictional force?

..... (01)

(iv) Calculate the unbalanced force acting on the object when B is moving with the acceleration of 2 m s^{-2}.

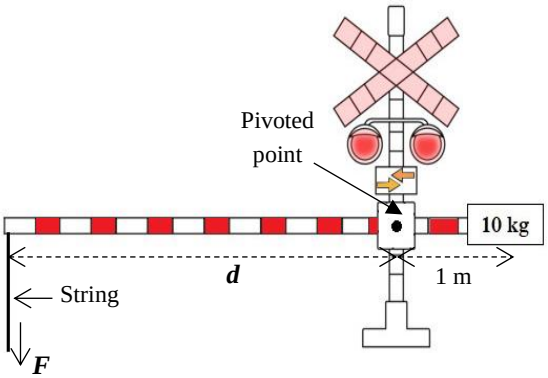
..... (02)

(v) The figure shows an instance where the object remains at rest after the string is removed from setup ***A***. At this point draw all the forces acting to keep the object in equilibrium in the same figure. The point of application of forces should be marked. (02)

(B) The image shows a safety gate at a railway crossing. Pulling down on the string closes the gate and releasing the string opens the gate. Consider that the mass of the crossbar in the figure is negligible. (***g*** = 10 m s^{-2})

(i) If ***F*** is the force applied to the string and ***d*** is the distance from the pivot point to the point where the string is tied, write an expression to find the moment of the force produced by pulling the string.

..... (01)



(ii) Find the moment caused by the 10 kg load around the pivot point?

.....

..... (02)

(iii) State whether the force F required to close the gate increase or decrease in the following instances. (02)

(a). Increasing the mass of 10 kg load:

.....

(b) Increasing the length of ***d***:

.....

(iv) Calculate the potential energy stored in the 10 kg load when it rests vertically 1 m above ground level when the gate is closed.

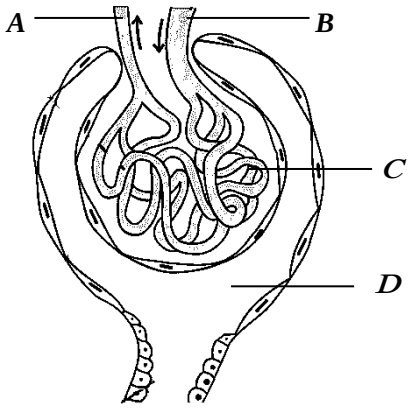
..... (02)

15

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 the Bowman's capsule in a human kidney.



(i) Name the parts ***A, B*** and ***C*** of the given figure. (03)

(ii) Write down a structural difference between the blood vessels ***A*** and ***B***. (02)

(iii) What is the name given to the process when a part of the blood gets filtered into ***D*** from ***C***. (02)

(iv) State the difference in composition of blood entering from ***B*** and leaving from ***A***. (02)

(v) What is the tissue that makes up the wall of the Bowman's capsule? (01)

(vi) Name a component that is present in the fluid of a healthy persons D but not in the urine. (01)

(***B***) A farmer wanted to obtain more orange plants from an orange plant with distinctive characters. in his field, many plants with those superior traits at once.

(i) Suggest a suitable propagation method for this. (01)

(ii) Mention an advantage and a disadvantage of the propagation method you have named. (02)

(iii) After removing the bark from one branch of the orange plant, the orange yield on that branch increased. Give a simple explanation for the statement. (02)

(***C***) It was observed that there were more plants with round seeds and few plants with wrinkled seeds among the pea plants obtained by planting the seeds of a garden pea plant with round seeds. Taking the round seed characteristic as ***R*** and the wrinkled seed characteristic as ***r***,

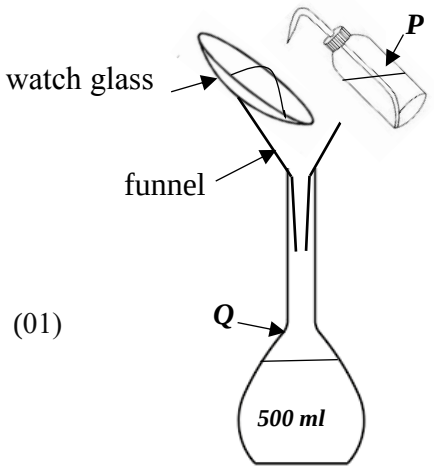
(i) Write the genotypes of the mother plants. (01)

(ii) Show how the characteristics of pea plants changed with the help of a punnet square. (02)

(iii) Mention the genotypes and phenotype ratios of daughter plants. (02)

(20 Marks)

6. (***A***) The materials and equipment used to make prepare 500.00 cm3 of 1.00 mol dm3 a standard NaCl solution are shown in the figure.



(i) Name ***P*** and ***Q*** mentioned in the setup. (02)

(ii) Name an instrument that can be used to measure the mass of NaCl in the preparation of the above solution. (01)

(iii) What is the mass of NaCl required to prepare the above solution? (molar mass of NaCl 58.5 g mol^{-1}.) (02)

(iv) (a) Should the mass of NaCl on the watch glass be flushed into the apparatus ***Q*** from the bottom of the watch glass to the top, or from the top to bottom? (01)

(b) State the reason for your answer. (01)

(v) The concentration of the prepared solution was observed to be less than 1.00 mol dm^{-3}. State a reason why the concentration is getting less than the expected value. (01)

(a) If the NaCl crystals in the laboratory to prepare the solution were contaminated with KCl, what separation technique can be used to separate pure NaCl crystals from them? (01)

(b) Write down an example of a practical application of using this technique. (01)

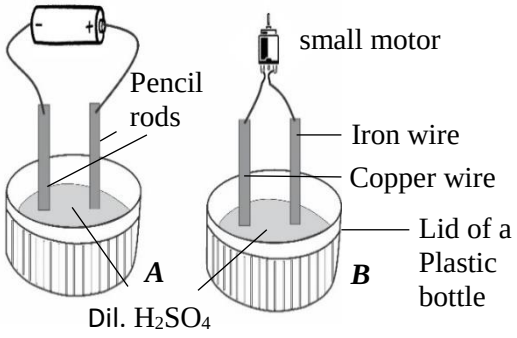
(*B*) Liquid Petroleum Gas (L.P.G) contained in domestic gas cylinders is a colourless gas mixture prepared by mixing an odourous chemical compound called Mercaptan with an odourless hydrocarbon gas mixture.

(i) Propane gas is one of the two constituent gases in the L.P gas mixture.
  (a) What is the other constituent gas in the L.P gas mixture? (01)
  (b) Draw the structural formula of Propane? (02)

(ii) Is the air mixture homogeneous or heterogeneous? (01)

(iii) What is the advantage of adding Mercaptan to the L.P gas mixture? (01)

(***C***) Two sets of an apparatus A and B prepared by a student for a laboratory activity are given here.



(i) Which of these two set ups represents the electrochemical cell? (01)

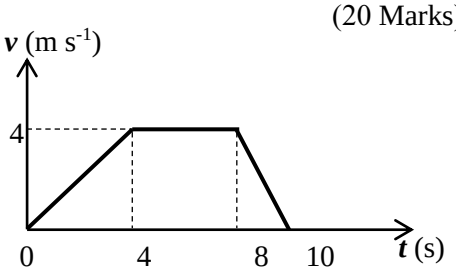
(ii) Name two types of anions present in the solution both ***A*** and ***B*** set ups. (01)

(iii) (a) Write a common observation when these two set ups are in operation. (01)

(b) Write the balanced chemical equation corresponding to that general observation. (02)

(20 Marks)

7.(***A***) The velocity-time graph of an object moving along a straight line is shown in the figure below.

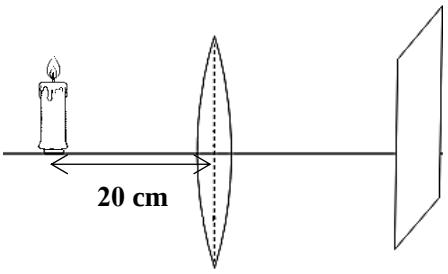


(i) What is the maximum velocity of the object. (01)

(ii) Find the acceleration of the object in the first 4 s. (02)

(iii) What is the displacement of the object after 10 s? (02)

(***B***) The figure shows a candle placed in front of a convex lens of focal length 10 cm. A screen is placed on the other side of the lens.



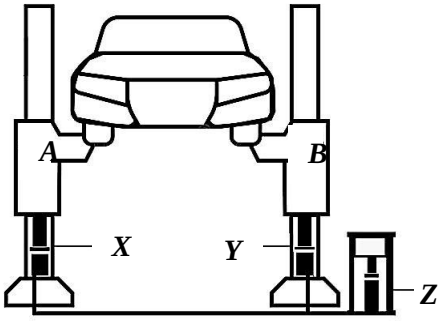
(i) Draw a standard ray diagram to show the reflection from the candle flame. (02)

(ii) Write three characteristics of the image formed. (02)

(iii) What type of mirror can form an image similar to the characteristics of the image formed in this lens. (01)

(iv) Electromagnetic wave is one of the energy forms which is emitted from a lighted candle.
  (a) Name two types of electromagnetic waves emitted by the candle. (02)
  (b) State one practical use of each of the waves mentioned in question (a) above. (02)
  (c) Write a characteristic that distinguishes electromagnetic waves from mechanical waves. (01)

(***C***) A vehicle lift used in a vehicle garage is shown in the image. When pump ***Z*** pumps oil to pistons ***X*** and ***Y***, the associated arms A and B are lifted up.



(i) An arm exerts an upward force of 4000 N on the car. Calculate the resultant force exerted on the car by both arms ***A*** and ***B***. (02)

(ii) If the pressure exerted by the fluid in the pump ***Z*** is 10000 Pa, what is the pressure exerted by the fluid on the piston X? (The pressure due to the height of the liquid layer is negligible) (01)

(iii) Apart from this, mention two applications where pressure transmission is used in practice. (02)

(20 Marks)

8. (***A***) The two vertebrate groups Aves and Mammalia are found in terrestrial, aquatic, and arboreal environments.

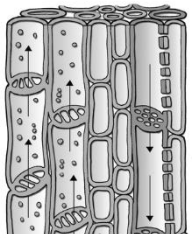
(i) Name a characteristic common to only the two phylum Aves and Mammalia that is not found in other vertebrate groups. (01)

(ii) Write two characteristics that are unique to mammals. (02)

(iii) Name an animal belongs to the group Mammalia which lives in an aquatic environment. (01)

(iv) Name the special shape of the body adapted for flying in birds and explain its importance. (02)

(***B***) Two vascular tissues in the plant body are indicated by ***P*** and ***Q*** in the figure.



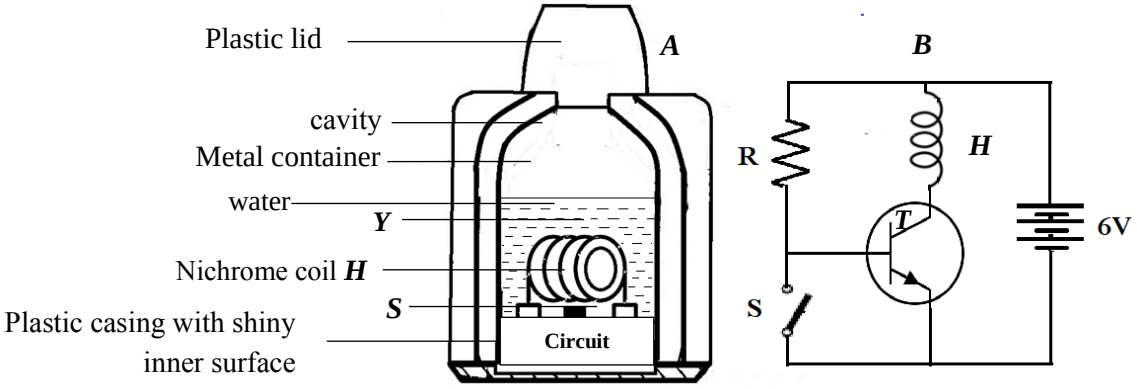
P ***Q***

(i) Name the tissues ***P*** and ***Q***. (02)

(ii) Write separately what are the main functions of the two tissues. (02)

(iii) State a structural feature that can distinguish tissue ***P*** from tissue ***Q***. (01)

(***C***) Figure ***A*** shows a demonstration of an automatic electronic kettle designed for a science exhibition. Figure ***B*** shows a diagram of the electronic circuit used to heat it. ***S*** is a temperature sensitive switch and ***H*** is a nichrome coil.



(i) Name the components ***T*** and ***R*** respectively. (02)

(ii) Should the switch S be closed or open for the nichrome coil to operate? (01)

(iii) When the circuit is turned on, the potential difference across the coil ***H*** is 5 V and the current flowing through the coil is 10 A. Calculate the power of the coil ***H***. (02)

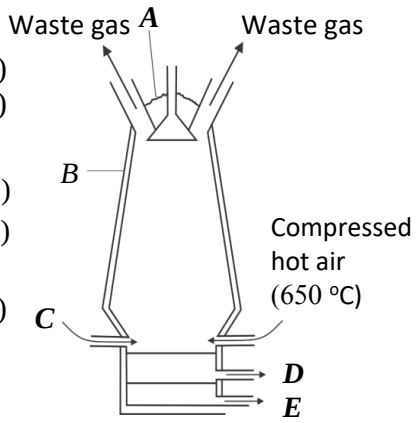
(iv) A student states that it is better to place the nichrome coil at a higher point Y than at a lower level in the water. Explain with reasons whether you agree or not with this statement. (01)

(v) Calculate the amount of heat required to raise the temperature of 0.1 kg of water by 10 ^{o}C if there is no heat loss (specific heat capacity of water = 4200 $J\ kg^{-1}\ {}^{o}C^{-1}$) (02)

(vi) State a measure taken to prevent heat loss from this kettle to the external environment and the form of heat transfer prevented here. (02)

(20 Marks)

9. ***(A)*** A diagram of a blast furnace used for iron extraction is shown here.



(i) One component of the mixture entering from point ***A*** is hematite (Fe_2O_3). Name the other two components. (01)

(ii) Why fire clay bricks are used to make ***B***? (01)

(iii) The temperature inside the blast furnace is higher than the temperature of the hot air entering through ***C***. Explain the reason for this. (02)

(iv) Name the materials that are removed from locations ***D*** and ***E***. (02)

(v) Name a harmful gas other than carbon dioxide present in the exhaust gas emitted from blast furnace. (01)

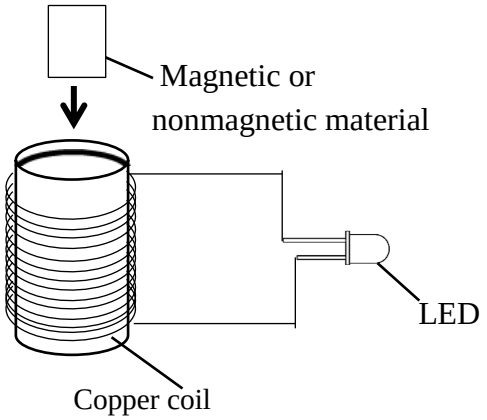
(vi) Carbon monoxide oxidizes hematite in iron ores. The corresponding balanced chemical reaction is shown below.

$$Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$$

A mixture of iron ore fed into the blast furnace could produce 56 kg of iron. Calculate the mass of Fe_2O_3 contained in the iron ore mixture used here. (Fe=56, O=16, C=12) (03)

(***B***) A diagram of a simple device made to detect pieces of metal with magnetic properties is shown below.

When a magnetic material is dropped from top to bottom through copper coil, the LED will flash and then turn off instantly.



(i) What is the name given to the phenomenon of producing electricity when magnetic material falls through copper coil? (01)

(ii) Write the energy transformation that occurs here. (01)

(iii) What is the main reason for not lighting the LED when some magnetic materials are dropped through the coil? (01)

(iv) Write a change that can be made to increase the sensitivity of this device. (01)

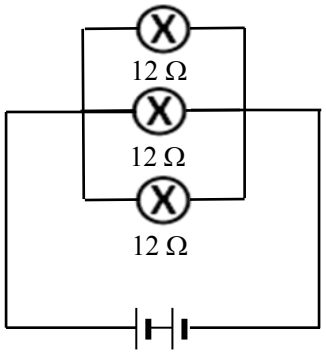
(v) Name another device that operates on the same principle of generating electricity as this device. (01)

(***C***) The figure shows an electrical circuit in which three bulbs are connected, each with a resistance of 12 Ω.

(i) What is the equivalent resistance of the circuit? (01)

(ii) If the cells provide a 12 V supply, Calculate the electric current flowing through the bulb. (02)

(jj) Name two physical quantities related to electricity that increase when the number of cells increases. (02)



(20 marks)

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