G.C.E. (O.L.) Support Seminar - 2016

Science I

One hour

Instructions :

(i) ***Answer all Question***

(ii) *In each of the Question 1 to 40, pick one of the alternatives (1), (2), (3), (4) which you consider is correct or most appropriate.*

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1. Which organelle given below cannot be seen in animal cells, but in plant cells?
(1) Cytoplasm (2) Vacuole (3) Nucleus (4) Mitochondrion

2. Which of the following is **not** an element?
(1) Carbon (2) Iron (3) Steel (4) Sodium

3. What is the unit of acceleration?
(1) $m^{-1}\,s$ (2) $m\,s^{-1}$ (3) $m^{-2}\,s$ (4) $m\,s^{-2}$

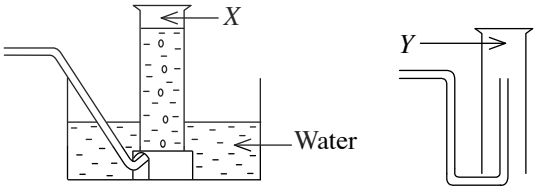
4. What is the first thing made in a plant leaf as a product of photosynthesis?
(1) Glucose (2) Starch (3) Sucrose (4) Lipid

5. Colour of phenolphthalein in a medium with hydroxyl (OH^-) ions is,
(1) pink (2) yellow (3) blue (4) purple

6. Select the choice with scalar quantities only?
(1) Work and acceleration (2) Energy and power
(3) Speed and weight (4) Displacement and pressure

7. Method of dispersal of the seed shown in the diagram is,
(1) animals (2) water
(3) wind (4) explosion

8. Set-ups arranged by a student to collect two gases are given in the diagram.
Identify gases *X* and *Y* respectively.
(1) H_2 and O_2
(2) O_2 and CO_2
(3) CO_2 and O_2
(4) O_2 and H_2



9. The characteristic which helps differentiate the same note played by two musical instruments is,
(1) quality (2) loudness (3) frequency (4) pitch

10. Select the instance where there is an unbalanced force act.
(1) An object resting on a table
(2) A ball staying stationary when hung from a string
(3) Movement of an object thrown vertically upwards
(4) Movement of a object along a straight path with constant velocity

11. Select the answer which correctly gives the scientific name of a mango species according to binomial nomenclature?
(1) MANGIFERA INDICA (2) *Mangifera Indica*
(3) mangifera Indica (4) *Mangifera indica*

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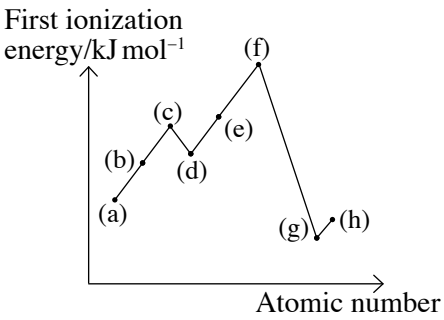
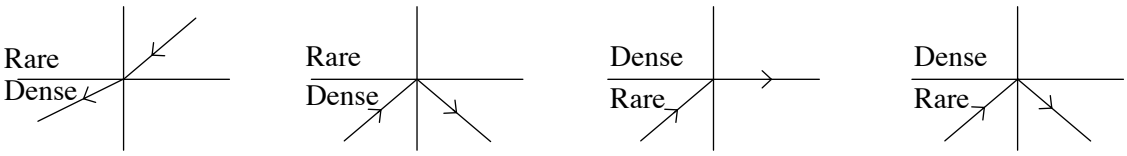
• Variation of the first ionization energy of eight consecutive elements in the periodic table is shown in the graph. Questions **12** and **13** are based on this graph. (a, b, c, d, e, f, g and h are not the standard symbols)



12. Which element has the electronic configuration of a noble gas?
(1) a (2) c
(3) f (4) h

13. Which element shows the highest electronegativity?
(1) b (2) d (3) e (4) g

14. Which of the following diagram correctly shows refraction of a light ray through rare and dense media?

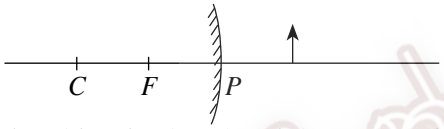


(1) (2) (3) (4)

15. Select the choice only with virus caused sexually transmitted diseases
(1) Herpes, AIDS (2) Herpes, syphilis (3) Gonorrhoea, syphilis (4) Gonorrhoea, AIDS

16. Deficiency of which vitamin causes scurvy?
(1) Vitamin A (2) Vitamin B (3) Vitamin C (4) Vitamin D

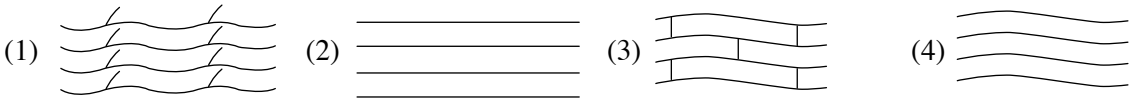
17.



An object is placed upright on the principal axis in front of a convex mirror. What happens to the image when the object is moved towards the mirror?
(1) Becomes smaller and gets closer to the mirror
(2) Becomes bigger and gets closer to the mirror
(3) Becomes smaller and gets away from the mirror
(4) Becomes bigger and gets way from the mirror

18. Which of the following transmits human hereditary characteristics from generation to generation?
(1) Nucleus (2) Mitochondrion (3) Genes (4) Ribosomes

19. Which diagram shows the molecular level structure of vulcanized rubber?



20. Given below are some instances where heat transfer takes place.
(a) Feeling hot when touching the end of a metal rod whose other end is placed in a hearth
(b) Movement of plant leaves above a fire
(c) People in a vehicle with closed shutters feeling warmth when passing a fire
In (a), (b) and (c) heat transfers respectively by,
(1) conduction, radiation and convection (2) convection, conduction and radiation
(3) radiation, convection and conduction (4) conduction, convection and radiation

21. Types of white blood cells shown by *A* and *B* in order are,
(1) eosinophils and monocytes
(2) neutrophils and monocytes
(3) monocytes and lymphocytes
(4) neutrophils and basophils

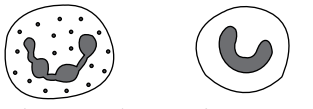


Diagram *A* Diagram *B*

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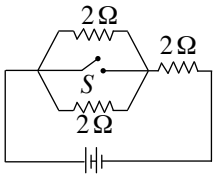
22. Examples for some industrial processes are given below.

A - Extraction of cinnamon oil
B - Extraction of salt from sea water
C - Production of cement using limestone

Which of the above use separating techniques?

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

23. What is the total resistance of this circuit when the switch S is closed (ON)?



(1) 6 Ω (2) 4 Ω
(3) 3 Ω (4) 2 Ω

24. pH value of the medium changes as food travels along the digestive tract from mouth to oesophagus, stomach and small intestine. The order in which pH value changes from mouth to small intestine is,

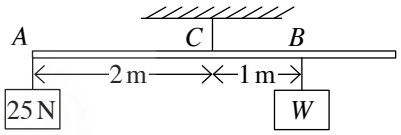
(1) acidic, neutral, basic, acidic (2) neutral, neutral, acidic, basic
(3) basic, neutral, acidic, neutral (4) basic, basic, acidic, basic

25. $x\text{Al} + y\text{HCl} \longrightarrow z\text{AlCl}_3 + 3\text{H}_2$

According to this reaction, values for x, y and z in order are,

(1) 2, 3, 6 (2) 2, 6, 3 (3) 3, 6, 2 (4) 2, 6, 2

26. A light rod suspended at the point *C* stays in equilibrium. What is the value of *W*?



(1) 25 N (2) 50 N
(3) 75 N (4) 100 N

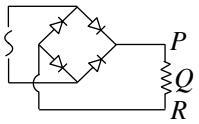
27. How organisms can be classified as domains?

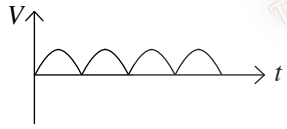
(1) Fungi, plantae, animalia (2) Bacteria, protozoa, algae
(3) Eukarya, archaea, bacteria (4) Bacteria, cyanobacteria, fungi

28. A solution is prepared by dissolving 80 g of sodium hydroxide in 360 g of water. What is the mole fraction of sodium hydroxide? (H = 1, O = 16, Na = 23)

(1) $\frac{1}{11}$ (2) $\frac{2}{11}$ (3) $\frac{2}{9}$ (4) $\frac{1}{4}$

29. Which graph shows the correct output waveform of the current obtained from the rectifying circuit shown in the diagram?



(1)


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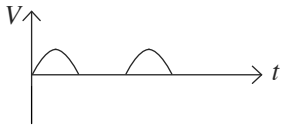

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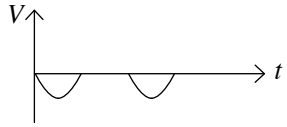

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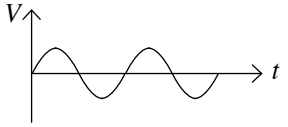

30. Which of the following phases in menstrual cycle take place in the ovary? '

(1) Menstruation, proliferative phase (2) Follicular phase, secretory phase
(3) Follicular phase, luteal phase (4) Proliferative phase, secretory phase

31. The gas causing a bad smell in a water body with eutrophication is,

(1) Hydrogen sulphide (2) Carbondioxide (3) Nitrogen (4) Helium

32. Some harmful effects of environmental pollution are given below.

A - Death of aquatic organism
B - Dissolving of rocks like limestone
C - Changing of gas percentages in the air
D - Eutrophication

Which of these are caused by acid rains?

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

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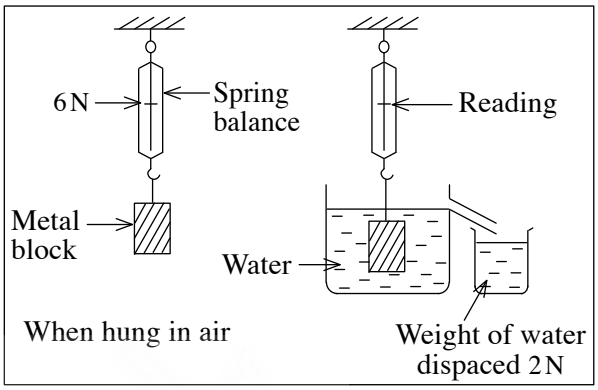
33. All biomolecules in living matter contain,
(1) carbon, hydrogen and nitrogen
(2) carbon, hydrogen and oxygen
(3) hydrogen, oxygen and phosphorus
(4) hydrogen, oxygen and nitrogen

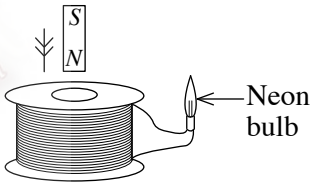
34. What is the mass of sodium hydroxide needed to prepare 500 cm^3 a solution with a concentration of 1 mol dm^{-3} ? (Na = 23, O = 16, H = 1)
(1) 10 g (2) 20 g (3) 30 g (4) 40 g

35. It is marked as 100 W and 230 V on a cover of the filament bulb. What is the current flowing through the bulb when connected to the house hold circuit?
(1) 0.34 A (2) 0.43 A (3) 0.51 A (4) 2.3 A

36. Consider the diagram given. What is the reading on the spring balance when the metal block is immersed in water?
(1) 2 N
(2) 4 N
(3) 6 N
(4) 8 N



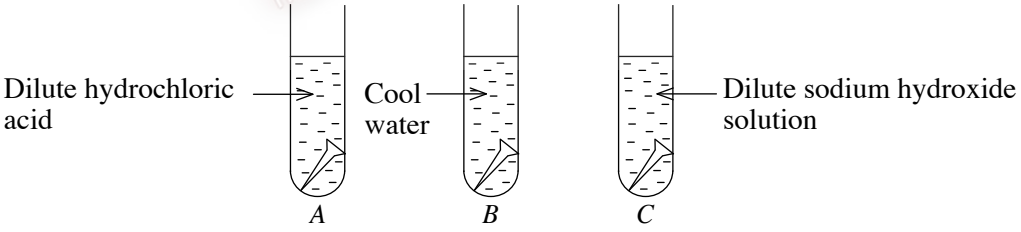
37. Diagram shows a coil with many turns of insulated copper wire wound round a bobbin. Ends of the coil are connected to a neon bulb. A strong bar magnet is moved fast up and down through the hole of the coil. Consider the following statements



A - Neon bulb instantly glows when the magnet is moved fast into the coil.
B - Neon bulb instantly continues to glow when the magnet is kept inside the coil.
C - Neon bulb instantly glows when the magnet is moved fast away from the coil.

What is/are correct out of the above statements?
(1) *A* only. (2) *B* only. (3) *A* and *B* only. (4) *A* and *C* only.

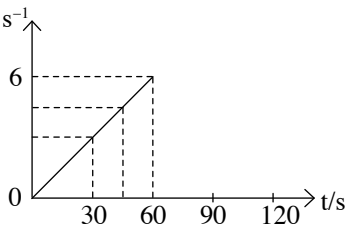
38. Rate of rusting was studied keeping things in following test tubes for an equal time duration.



Descending order of rate of rusting is,
(1) *A*, *B* and *C* (2) *B*, *A* and *C* (3) *C*, *B* and *A* (4) *B*, *C* and *A*

39. Mass of a sodium atom is 3.819×10^{-23} g. Value of atomic mass unit is 1.67×10^{-24} g. What is the relative atomic mass of sodium?
(1) $\frac{1.67 \times 10^{-24}\,g}{3.819 \times 10^{-23}\,g}$ (2) $\frac{3.819 \times 10^{-23}\,g}{1.67 \times 10^{-24}\,g}$ (3) $\frac{1.67 \times 10^{-24}\,g}{3.819 \times 10^{-23}\,g \times \frac{1}{12}}$ (4) $\frac{3.819 \times 10^{-23}\,g}{1.67 \times 10^{-24}\,g \times \frac{1}{12}}$

40. Data regarding the motion of an object travelled along a straight road are given in the velocity-time graph. Consider the following statements about this motion.



A - It has travelled at uniform deceleration during the first 30 seconds
B - A constant force has acted on the object during the first 60 seconds
C - Velocity of the object is 4.5 m s^{-1} when t = 45 s.

What is/are correct according to the above statements.
(1) *A* only. (2) *B* only. (3) *A* and *C* only. (4) *B* and *C* only.

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G.C.E. (O.L.) Support Seminar - 2016

Science II | ***Three hours***

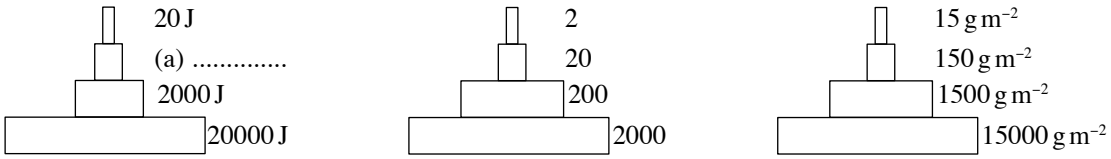
Instructions :

(i) *Answer **four** questions in Part* **A**, *in the space provided.*

(ii) *Answer **three** questions in Part* **B**.

Part A - Structured Essay

1. (A) Three pyramids which show the number, biomass and energy of organisms belonging to different trophic levels in an ecosystem are give below.



(i) Name the ecological pyramids given as *Y* and *Z* above.

Y - ..... *Z* - .....

(ii) What is the value suitable for blank (a) in the pyramid *X* ?

.....

(iii) Out *X*, *Y* and *Z*, which pyramid/s has/have the possibility to be inverted?

.....

(iv) Write a four - linked food chain to represent trophic level given above.

.....

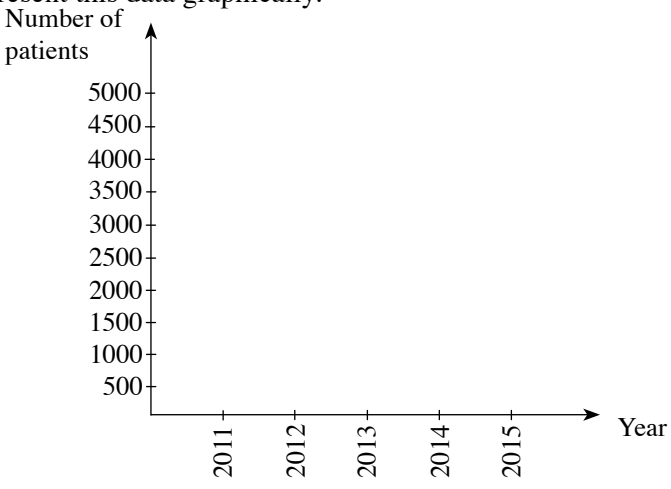
(v) If a heavy metal enters the above ecosystem, Which organism embodies the highest concentration of if ?

.....

(B) Table gives some hypothetical data on the distribution of chronic kidney disease in one province in Sri Lanka.

Year	Number of patients
2011	250
2012	600
2013	750
2014	2000
2015	5000

(i) Represent this data graphically.



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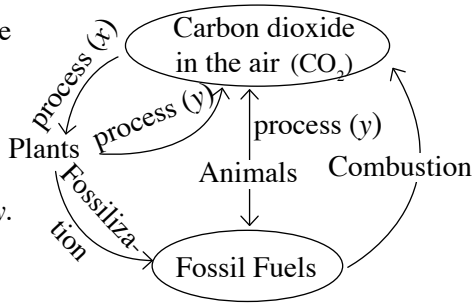
(ii) According to the data given, what prediction can you make about the distribution of chronic kidney disease?

.....

.....

(C) The diagram shows a sketch of the carbon cycle in the biosphere.



(i) Name the process *x*.

.....

(i) Write a difference between the process *x* and the process *y*.

.....

.....

(D) P and Q given below are breakfast taken by two person in Colombo.

Meal *P*	**Main food substance**	**Distance to the place of production (miles)**
Red rice	Red rice	2 (His own Paddy Field)
Potato curry	Potato	90 (Nuwara Eliya)
Sambol	Coconut	80 (Anuradhapura)
Papaw	Papaw	0 (His Own garden)

Meal *Q*	**Main food substance**	**Distance to the place of production (miles)**
Basmati rice	Basmati rice	1720 (Pakistan)
Potato curry	Potato	925 (India)
Onion sambol	Onion	925 (India)
Apple	Apple	4000 (Australia)

(i) Calculate the food mile for meals *P* and *Q* separately.

.....

.....

.....

.....

.....

(ii) (a) According to the above values, which type of meals (*P* and *Q*) are more important for the development of a country?

.....

(b) Write a reason for your answer.

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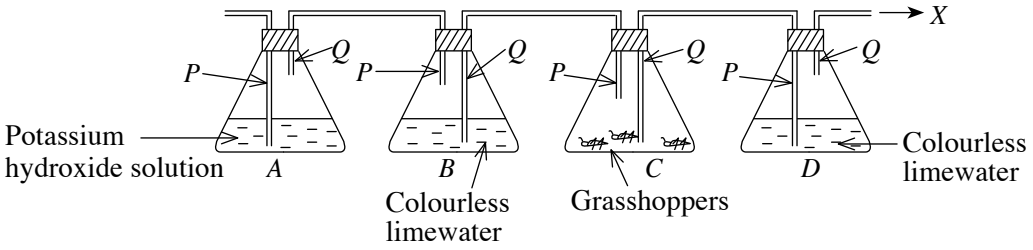
2. (A) The diagram shows a set up arranged to show that carbon dioxide is produced in respiration.



(i) Which device should be connected to the end "*X*" for the functioning of this set up?

.....

(ii) Even though the device mentioned in (i) above is connected, this does not function due to a defect in it. What is that defect?

.....

(iii) Write the purpose of each of the following used in this set up after correcting the defect.

(a) Potassium hydroxide solution .....

(b) Colourless limewater in flask *B* .....

(c) Colourless limewater in flask *D* .....

(B) Given below are some characteristics of invertebrates.

P	Shell made of calcium carbonate
Q	Jointed legs
R	Spiny body covering
S	Two-layered body (diploblastic)
T	Chitinous exoskeleton

(i) Out of above what are the characteristics shown by grasshoppers?

.....

(ii) Write the letters of the characteristics not shown by grasshoppers and state the phylum of invertebrates which show those characteristics

Letter	Phylum of invertebrates showing the relevant characteristic

(C) Shown below are electron, microscopic, diagrams of few organelles that can be seen in a cell.

X *Y* *Z*

Complete the table regarding these two organelles.

Organelle	Name of the organelle	Main function
X	.....	Secretion and transport of substances
Y	.....	.....
Z	.....	.....

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3. (A) Four set ups *A*, *B*, *C* and *D* are arranged using calcium carbonate and dilute hydrochloric acid to study the factors affecting reaction rate. Their information are given below.

set up	Nature and mass of calcium carbonate	Concentration of hydrochloric acid	Temperature
A	50 g in powdered form	1 mol dm^{-3}	30°C
B	50 g in powdered form	2 mol dm^{-3}	30°C
C	50 g in pieces	2 mol dm^{-3}	30°C
D	50 g in powdered form	2 mol dm^{-3}	60°C

(i) Use the information give above to complete the following table.

	Pair of set ups	Which factor affecting the reaction rate could be studied
(a)	*A* and *B*	
(b)	*B* and *C*	
(c)	*B* and *D*	

(ii) Name the gas produced by the reaction between calcium carbonate and dilute hydrochloric acid?

.....

(iii) Write an activity done to identify the gas mentioned in (ii) above.

.....

.....

(B) The table shows the results of experiments done at the laboratory compare the reactivity three metals *P*, *Q* and *R*. ('√' shows that the metal reacts and '×' shows it does not react)

metal	with hot water	with steam	with dilute acids
P	×	√	√
Q	×	×	×
R	√	√	√

(i) Arrange *P*, *Q* and *R* in descending order of their reactivity.

.....

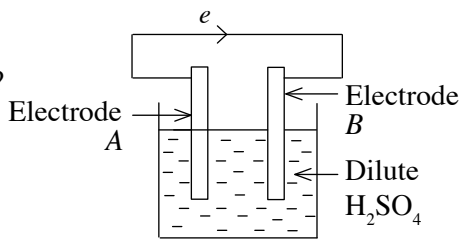
(ii) Out of *P*, *Q* and *R*, which metal is below hydrogen in the activity series?

.....

(iii) Which metal out of *P*, *Q* and *R* can be used to give cathodic protection to iron?

.....

- The diagram shows an electrochemical cell.



(iv) Out of *P* and *R* which could be used as *A* electrode?

A .....

(v) At which electrode does the following half reaction takes place?

$2H^+(aq) + 2e \longrightarrow H_2(g)$

.....

(vi) Near which electrode oxidation takes place?

.....

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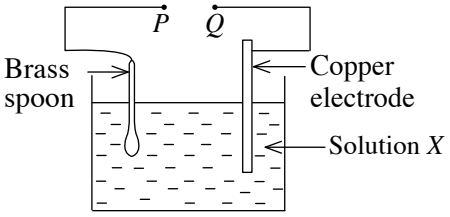
(C) A student used the set up given in the diagram to copper-plate a spoon

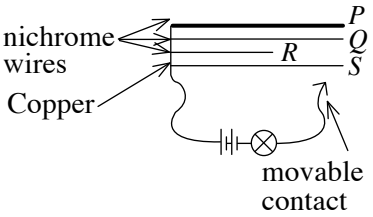


(i) Name a solution which could be used as *X*.

.....

(ii) Show in the diagram how to connect a cell between *P* and *Q*.

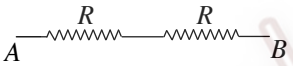
4. (A) The set up arranged to study the factors affecting resistance using wires *P*, *Q*, *R* and *S* is given in the diagram. Wires *Q*, *R* and *S* have the same cross sectional area.



(i) The movable contact is kept separately at the end of each wire *P*, *Q*, *R* and *S*. Relative brightness and accordingly the factors affecting the resistance are noted down incompletely in a table. Complete the table.

Pair of wires used	Bulb glows brighter with the wire	Factor affecting resistance
P and *Q*	*P*	.....
..... and	.....	Length of the wire
Q and *S*	.....	.....

(ii) Diagrams show two instances where resistors are connected. Resistance of each resistor is *R*. State the total resistance in each instance.

(a) 

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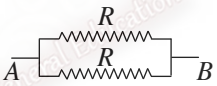
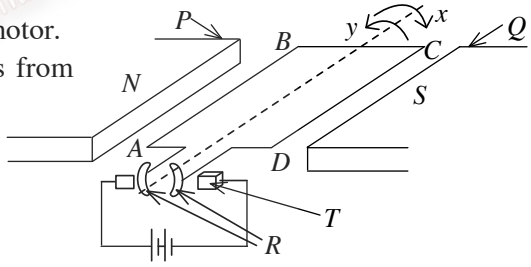
(b) 

.....

(*B*) The diagram shows a model of a direct current (DC) motor.



(i) State whether the magnetic field in this set up is from *P* to *Q* or *Q* to *P*.

.....

(ii) Name *R* and *T*.

R - .....

T - .....

(iii) Why is it required to break *R* into two parts?

.....

(iv) State whether this motor rotates to the side of *x* or *y* when current is supplied.

.....

(v) What happens to the direction of rotation of the motor when the current direction is reversed?

.....

(vi) Select from *AB*, *BC* and *CD*, the conductor on which the magnetic force does **not** act.

.....

(vii) Write the reason for your answer in (vi).

.....

**

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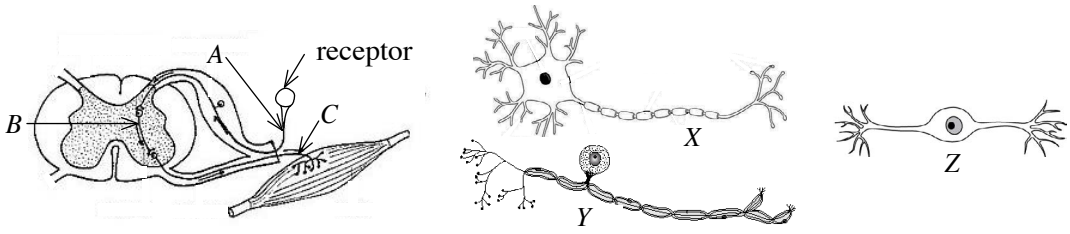
Part B - Essay

- Answer any **three** questions.

5. (A) Diagrams show some parts related to the nervous system as *W*, *X*, *Y* and *Z*.



Write the relevant letter for each of the following.

(i) What is the functional unit of the nervous system?

.....

- Answer the following questions by using the letters given to the diagrams.

(ii) Name the structure which act an B out of X,Y and Z answer the following questions by using the letters given to the diagrams. .....

(iii) Neuron which transmits impulses to central nervous from a receptor. .....

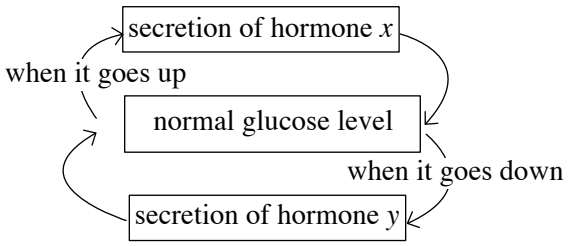
(B) (i) Copy and Complete the following table regarding the types of muscular tissues in the organs given.
(use √ to show that the characteristic is present and × to show the absence)

Organ	Uninucleated cells	Striated	Voluntary	Branched cells
Heart				
Stomach				

(ii) Which of the above organs has muscles which never fatigue?

(iii) Name another organ which has the type of muscle tissue found in the stomach.

(C) A chart showing the regulation of blood glucose level in our body is given below.



(i) (a) Name hormones *x* and *y* given in Chart *A*.

(b) Name the gland which secretes *x* and *y* and its location

(c) Name the disease caused due to lack of the hormone *x*.

(d) Write the function of each hormone x and y in regulation of glucose level

(ii) (a) State whether secretion of ADH increases or decreases in following instances.
When the water level of blood goes up
When the water level of blood goes down

(b) When the water level goes down, which process in nephron helps regulation?

[See page seven

(c) What is the defect occurring in pelvis or bladder if the process mentioned in (ii)(b) above takes place too much?

6. (A) Acids are used in laboratories and in kitchen for different purposes.

(i) Name a strong acid mostly used in the school laboratory and an acid found in the kitchen.

(ii) Some bottles without labels contain aqueous solutions of copper sulphate, potassium permanganate, hydrochloric acid and sodium hydroxide. A magnesium strip is put into each solution. Some observations made are given in the following table.

Solution	Colour of the solution	Does it react with magnesium?	Does the reaction produce gas?
(a)	Blue	Yes	Yes
Dilute hydrochloric acid	Colourless	Yes	(b)
(c)	(d)	No	No
Sodium hydroxide	Colourless	(e)	No

Using data given in the table, Write the answers to (a), (b), (c), (d), (e)

(a) - (b) - (e) -

(c) - (d) -

(iii) Write the balanced chemical equation for the reaction between magnesium and dilute hydrochloric acid.

(iv) pH values of some solutions are given in the following table.

Solution	*A*	*B*	*C*	*D*	*E*
pH value	7.5	6	1.5	3.5	10

(a) Out of these, what is the strongly acidic solution?

(b) Which colour litmus paper gives a colour change when immersed in that solution?

(B) Atomic numbers of some elements are given in the following table. Use them to answer the questions given below. (*A*, *B*, *C*, *D*, *E*, *F* and *G* are not the standard symbols. Avogadro constant = 6.022×10^{23})

Element	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Atomic number	3	6	8	10	11	12	17

(i) Which elements given in the table belong to the same group of the periodic table?

(ii) Which element belongs to Period 2 and Group IV in the periodic table?

(iii) Which element does **not** take part in any reaction?

(iv) Write the electronic configuration of the element mentioned in (iii) above and explain why it does not take part in any reaction.

(v) Which element reacts vigorously with cold water?

(vi) Draw the Lewis structure of molecule formed by two atoms of *G*?

(vii) Write the molecular formula of the compound formed by combination of *F* and *G*.

(viii) Two atoms of C join and form a C_2 molecule. Relative molecular mass of C_2 is 32. Find the number of molecules in 16 g of C_2.

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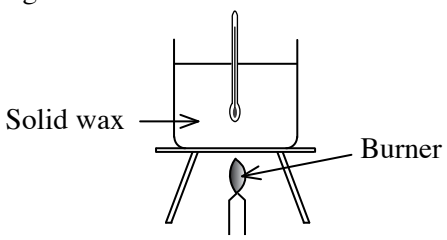
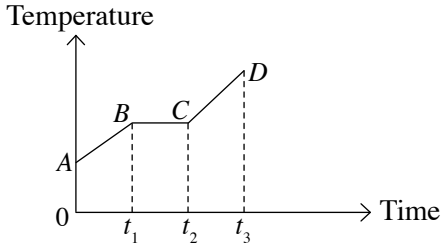
7. (A) The diagram shows heating of solid wax. The graph shows the variation of the temperature when heating solid wax.





(i) State the physical state of wax in following instances in Order.

Between *A* and *B* Between *B* and *C* Between *C* and *D*

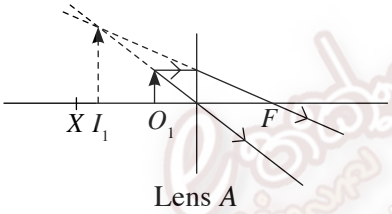
(ii) How do you determine the melting point of wax using the graph?

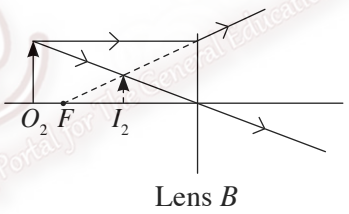
(iii) Even when continuously heated, no change in temperature is observed between *B* and *C*. What is called the heat supplied during this time interval?

(iv) *D* shows the boiling point of wax. Show in this graph itself how temperature varies if continuously heated by drawing a graph in your answer paper.

(v) If 200 g of wax was used in this experiment, find the amount of heat needed to heat wax from 40 °C to 50 °C. (specific heat capacity of wax is 2800 $J\,kg^{-1}\,K^{-1}$) (50°C < B)

(B) Diagrams show an image of an object formed by a converging lens and diverging lens.





(i) Select the converging lens from *A* and *B*.

(ii) (a) State whether the images I_1 and I_2 are real or virtual.

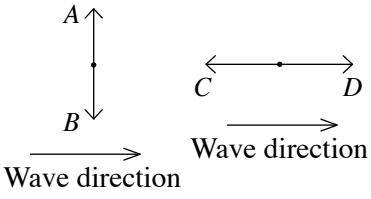
(b) How did you decide whether they are real or virtual?

(iii) Where is the object placed in front of lens *A* to get the image given?

(iv) Name a practical instance where lens *A* forms an image as shown in the diagram

(v) Write **two** properties of the image formed when the object O_1 is placed at *X*.

(C) Two ways in which particles vibrate in mechanical waves are shown in the diagram.



(i) What do you call the mechanical waves in which particles vibrate in the direction of *C* and *D*?

(ii) State an instance where particles vibrate in the direction of *A* and *B*.

(iii) Out of *A*-*B* and *C*-*D*, which shows the vibration of particles which propagates sound?

(iv) Write **two** differences between the type of mechanical waves mentioned in (ii) above and electromagnetic waves.

[See page nine

8. (A) Diagrams show flowers in two pea plants.

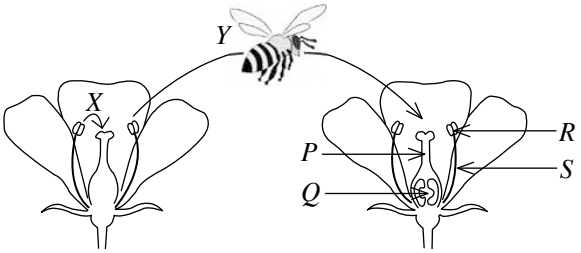


Diagram 1 Diagram 2

(i) Out of *P*, *Q*, *R* and *S*, which belong to the androecium?

(ii) Name the methods of pollination given as *X* and *Y*.

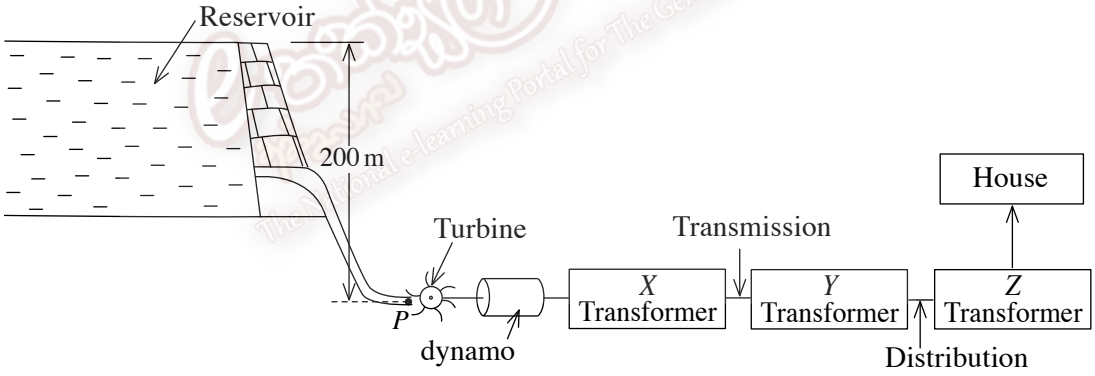
(iii) State whether flowers are more adapted for self-pollination or cross pollination. Write the reason for your answer.

(iv) The flower in Diagram 1 above produces green pods while the flower in Diagram 2 produces yellow pods. Green pods are homozygous dominant while yellow pods are homozygous recessive. Show the inheritance of pod colour in the plant generation produced by the type of pollination shown by Y. (Use "*G*" for green, "*g*" for yellow).

(v) Show in a Punnet Square the inheritance of the pod colour in F_2 produced by $F_1 \times F_1$.

(vi) Write the phenotypic ratio obtained in F_2.

(B) Use the following diagram to answer the questions.



(i) What is the form of energy in water when stored in the reservoir?

(ii) Explain why water in a reservoir at a higher place is used for the operation of the power station.

(iii) Energy transformation taking place in a hydropower station is given in the chart below.

(a)..... energy of water (when stored in the reservoir) → (b)..... energy of water (when water flows) → (c)..... energy of turbine → (d)..... energy of dynamo → electrical energy

Write the energy states denoted by (a), (b), (c) and (e)

(iv) Name the types of transformers given as *Y* and *Z*.

(v) Primary voltage of the transformer *X* is 25 kV while its secondary voltage is 220 kV. Find the turns ratio between primary and secondary coils.

(vi) According to the diagram, calculate the pressure exerted by water on the point "*P*".
(Density of water = $1000\,kg\,m^{-3}$, $g = 10\,m\,s^{-2}$)

[See page ten

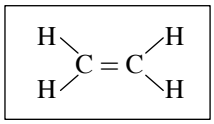
9. (A) Liquid petroleum gas (LPG) mainly contains propane and butane which are alkenes.

(i) Write the common molecular formula for alkenes taking the number of carbon atoms as n.

(ii) Write the molecular formula of propane.

(iii) Draw the structure of butane.

(iv) Polythene is a complex molecule made by polymerization of a large number of ethene molecules. Its molecular formula is C_2H_4. Diagram shows structural formula of ethene.



Accordingly, draw the repeating unit and polymer of polythene.

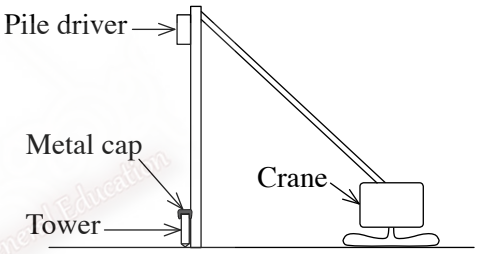
(B) 50 cm^3 of sodium hydroxide and 50 cm^3 of hydrochloric acid of equal concentration were mixed. The reaction released x kJ of heat.

(i) According to the heat change, what type of a reaction is this?

(ii) Represent the above reaction by an energy level diagram.

(C) Pile driver is used in tower foundation constructions.

(i) Mass of the pile driver lifted is 2000 kg. Find its weight. ($g = 10\ m\ s^{-2}$)



(ii) What is the strategy taken to minimize the wastage of energy as the pile driver strikes the tower?

(iii) Crane lifts this pile driver 20 m in 100 seconds.

(a) Find the gravitational potential energy stored in the pile driver when lifted.

(b) What is the power of the crane?

(iv) What energy transformation takes place as the pile driver falls?

(v) If no energy is wasted, find the velocity of the pile driver when it falls on the tower.

(vi) Draw the velocity-time graph for the motion of the pile driver till it falls on the tower from the moment it was dropped.

***

G.C.E. (O.L.) Support Seminar - 2016
Science - Paper I
Answer Guide

Question No.	Answer
1	2
2	3
3	4
4	1
5	1
6	2
7	3
8	2
9	1
10	3
11	4
12	3
13	3
14	2
15	1
16	3
17	2
18	3
19	3
20	4

Question No.	Answer
21	2
22	3
23	4
24	4
25	4
26	2
27	3
28	1
29	1
30	3
31	1
32	1
33	2
34	2
35	2
36	2
37	4
38	1
39	4
40	4

[See page two

G.C.E. (O.L.) Support Seminar - 2016
Science - Paper II
Answer Guide

Part A – Structured Essay

1. (A) (i) *Y* - Number Pyramid *Z* - Biomass Pyramid (02 marks)

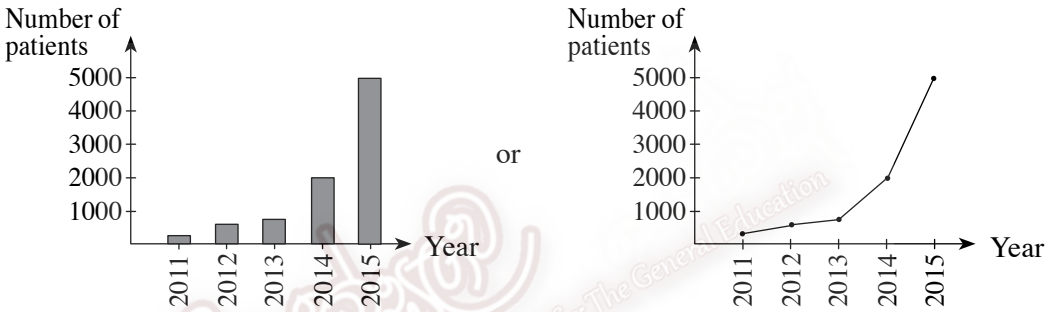
(ii) 200 J (01 mark)

(iii) *Y* and *Z* (01 mark)

(iv) Any correct food chain with 4 links. (01 mark)

(v) Organism in the last tropic level or name of the organism. (01 mark)

(B) (i)



(02 mark)

(ii) Number of kidney patients has increased with time. (01 mark)

(C) (i) Photosythesis (01 mark)

(ii) ∗ *x* absorbs CO_2 while *y* releases CO_2.
∗ *x* takes place in green plants while *y* takes place in any organism. (01 mark)

(D) (i) *P* = (2 + 90 + 80 + 0) miles = 172 miles
Q = (1720 + 925 + 925 + 4000) miles = 7570 miles (02 marks)

(ii) (a) *P* (01 mark)

(b) • Being ecofriendly / less environmental pollution.
• Less transport cost.
• Appreciating local things.
• Increase of sustainability (01 mark)

Total Marks 15

[See page three

2. (A) (i) Suction pump (01 mark)

(ii) P in flask "2" not touching the solution but *Q* touching the solution (01 mark)

(iii) (a) Potassium hydroxide solution - To absorb carbon dioxide in entering air (01 mark)
(b) Colourless limewater in flask "B" - To make sure that carbon dioxide is absorbed (01 mark)
(c) Colourless limewater in flask "D" - To identify carbon dioxide (01 mark)

(*B*) (i) *Q* and *T* (02 marks)

(ii)

Letter	Phylum of invertebrates showing the relevant characteristic
P	Mollusca
R	Echinodermata
S	Coelenterata / cnidaria

(03 marks)

(*C*) (i)

Organelle	Name of the organelle	Main function
X	Golgi complex	Secretion and transport of substances
Y	Nucleus	Controlling cellular activities
Z	Mitochondrion	Cellular respiration

(05 marks)

Total Marks 15

3. (A) (i) (a) Concentration (01 mark)
(b) Physical nature of reactant or surface area (01 mark)
(c) Temperarure (01 mark)

(ii) CO_2 / Carbondioxide (01 mark)

(iii) A glowing splint introduced into carbondioxide will go out or colourless limewater transmilty. When carbondioxide is sent through it. (02 marks)

(B) (i) $R > P > Q$ / *R, P, Q* (01 mark)

(ii) *Q* (01 mark)

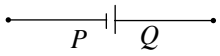
(iii) *R* / *P* (01 mark)

(iv) *A* - *P* (01 mark)

(v) *A* / *P* (01 mark)

(vi) *B* / *R* (01 mark)

(C) (i) $CuSO_4$ / Copper sulphate
Any salt of copper. (01 mark)

(ii) 

(02 marks)

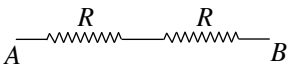
Total Marks 15

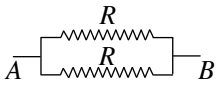
[See page four

4. (A) (i)

Pair of wires used	Bulb glows brighter with the wire	Factor affecting resistance
P and *Q*	*P*	Cross sectional area
Q and *R*	*R*	Length of the wire
Q and *S*	*S*	Type of conductor

(05 marks)

(ii) (a) 

- $2R$ (01) (b) 

- $\frac{R}{2}$ (01)

(02 marks)

(*B*) (i) *P* to *Q* (01 mark)

(ii) *R* - split rings *T* - brusher (02 marks)

(iii) To supply a continuous direct current. (01 mark)

(iv) *y* (01 mark)

(v) direction of rotation changes. (01 mark)

(vi) *B C* (01 mark)

(vii) It is parallel to magnetic field. (01 mark)

Total Marks 15

**

Part B - Essay

5. (A) (i) *Reflex are* (01 mark)

(ii) *Z* (01 mark)

(iii) *Z* (01 mark)

(B) (i)

Organ	Uninucleated cells	Striated	Voluntary	Branched cells
Heart	√	√	×	√
Stomach	√	×	×	×

8 ⟶ 04, 7/6 ⟶ 03, 5/4 ⟶ 02, 3/2 ⟶ 01, 01 ⟶ 00

(ii) Heart (02 marks)

(iii) Blood vessels, digestive tract, bladder (02 marks)

[See page five

(C) (i) (a) *x* - insulin
y - glucagon (02 marks)

(b) Gland - Pancreas
Location - At the bend of duodenum between stomach and large intestine (02 marks)

(c) Diabetes (01 mark)

(d) *x* - converting excess glucose into glycogen
y - converting glycogen into glucose (02 marks)

(ii) (a) When the water level goes up - decreases ADH Concentration
When the water level goes down - increases ADH Concentration (02 marks)

(b) Reabsorption (01 mark)

(c) Calculi (01 mark)

Total Marks 20

6. (A) (i) Laboratory - hydrochloric/sulphuric/nitric
Kitchen - citric/acetic (02 marks)

(ii) (a) - Copper sulphate (b) - Yes (e) - No
(c) - Potassium permanganate (d) - Purple
5 ⟶ 04, 4 ⟶ 03, 3 ⟶ 02, 2 ⟶ 01, 01 ⟶ 00

(iii) $Mg(s) + 2HCl(aq) \longrightarrow MgCl_2(aq) + H_2(g)$ (01 mark)

(iv) (a) *C* (01 mark)

(b) Blue (01 mark)

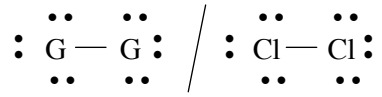
(B) (i) *A* and *E* / Lithium and Sodium / Li and Na (01 mark)

(ii) *B* / carbon / C (01 mark)

(iii) *D* / නියෝන් / Ne (01 mark)

(iv) 2, 8 (01 mark)
Its atoms have got full outer shells of electrons. (02 marks)

(v) *E* / Sodium / Na (01 mark)

(vi)  (01 mark)

(vii) FG_2 / $MgCl_2$ (01 mark)

(viii) Number of molecules in 32 g of C_2 = 6.022×10^{23}
Number of molecules in 16 g of C_2 = $6.022 \times 10^{23} \times \frac{16\,g}{32\,g}$ (01)
= 3.011×10^{23} (01) (02 marks)

Total Marks 20

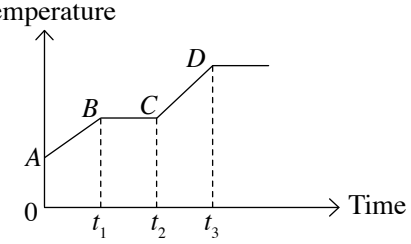
[See page six

7. (A) (i) *A* and *B* - solid *B* and *C* - solid and liquid *C* and *D* - liquid
(03 marks)

(ii) Even when heated, no change in temperature is there between *B* and *C* as it is at the melting point (01 mark)

(iii) Latent heat (01 mark)

(iv) Temperature



(..... marks)

(v) $Q = mc\theta$

$= \frac{200}{1000} \times 2800 \times (50 - 40)\,J = 5600\,J$ (02 marks)

(B) (i) *A* (01 mark)

(ii) (a) I_1 - virtual I_2 - virtual (02 marks)

(b) • The way in which light rays intersect or how they meet when extended backwards.
• Obtain the image on the same side where the object is
(01 mark)

(iii) Between the focus and the optical centre. (01 mark)

(iv) Magnifying glass / hand lens / Simple microscope
(01 mark)

(v) Magnified
Inverted
real (any two) (02 marks)

(C) (i) Longitudinal waves. (01 mark)

(ii) Water waves, transverse waves formed in a string. (01 mark)

(iii) Longitudinal / parallel / *C* and *D* (01 mark)

(iv)

Mechanical waves	Longitudinal waves
• Need a medium to travel • Slow speed • Do not have Electrical and Magnetic Properties.	• Need no medium to travel • Fast • Have Electrical and Magnetic Properties.

(01 mark)

Total Marks 20

[See page seven

8. (A) (i) *R* and *S* (01 mark)

(ii) *X* - Self - pollination *Y* - Cross pollination (02 marks)

(iii) Cross pollination / *Y*

Cross pollination helps produce new plants with genetic variations. (02 marks)

(iv) *P* : *GG* (Green) × *gg* (Yellow)

G : *G* *g* (01 mark)

Gg (Green) (01 mark)

(v)

♀ \ ♂	*G*	*g*
G	*GG*	*Gg*
g	*Gg*	*gg*

(02 marks)

(vi) Green : Yellow

3 : 1 (01 mark)

(B) (i) Potential energy (01 mark)

(ii) Then potential energy of water increases. Large amount of kinetic energy needed to rotate the turbine could be obtained when this water flows. (01 mark)

(iii)

(a)		(b)		(c)		(d)
Potential energy of water (when stored in the in the reservoir)	→	Kinetic energy of water (when water flows)	→	Kinetic energy of turbine	→	Kinetic/mechanical energy of dynamo → electrical energy

(02 marks)

(iv) *Y* - Step-down *Z* - Step-down (02 marks)

(v) 25 : 220

5 : 44 (02 marks)

(vi) $P = h \rho g$

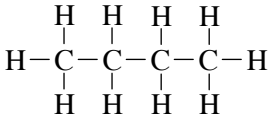
$= 200 \times 1000 \times 10$ (01 mark)

$= 2\,000\,000$ Pa (01 mark)

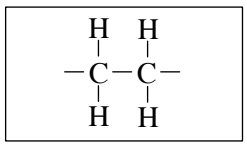
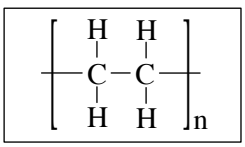
Total Marks 20

[See page eight

9. (A) (i) C_nH_{2n+2} (01 mark)

(ii)  (01 mark)

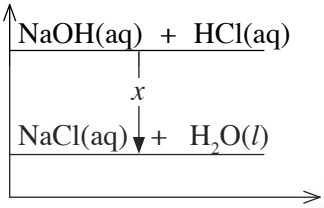
(iii) C_3H_8 (01 mark)

(iv)  

repeating unit polymer (02 marks × 2 = 04)

(B) (i) Exothermic reaction (1 marks)

(ii) Energy/kJ mol^{-1}



- Stating the physical state of reactants and products correctly. (01 mark)
- Marking the arrow correctly according to the heat change. (01 mark)

(C) (i) $F = ma$
$= 2000 \times 10 = 20000\,N$ (01 mark)

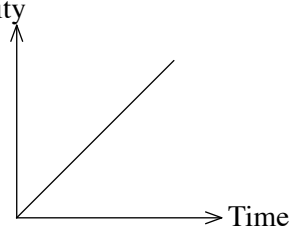
(ii) Having a metal cap (01 mark)

(iii) (a) Potential energy $= mgh = 2000 \times 10 \times 20$
$= 400000\,J$ (02 marks)

(b) Power $= \frac{\text{energy}}{\text{times}} = \frac{400000}{100}$
$= 4000\,W$ (02 marks)

(iv) Potential energy $\longrightarrow$ Kinetic energy (01 mark)

(v) $\frac{1}{2}mv^2 = mgh$
$v^2 = 2 \times 10 \times 20 = 400$
$v = 20\,m\,s^{-1}$ (02 marks)

(vi) 

(01 mark)

Total Marks 20

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