(34) Science

Structure of the question paper

Paper I - Time 01 hour.

This consists of 40 multiple choice questions. The paper is set to comprise **10 basic level questions** to measure the ability of recall, comprehension and application, **18 middle level questions, 6 higher order questions and 6 questions to measure the ability of analysis, synthesis and evaluation.** Each question carries 02 marks and the total marks for the paper is 80.

Paper II - Time 03 hours.
This consists of two parts A and B.

Part A
This consists of 4 structured essay questions and the candidates have to answer all the questions in the question paper itself. These four questions cover the respective competencies as stated below and **the questions are prepared so that at least 25% of the marks allocated for each question is related to practical activities.**

Question 01 : * Process of science and competency 4
Question 02 : Competency 1
Question 03 : Competency 2
Question 04 : Competency 3
Each question is worth of 15 marks adding up to a total of 60.

Part B
This **comprises 5 semi-structured questions** of which 3 should be answered. Each question carries 20 marks, so the total marks allocated is 60. The five questions cover the competencies as elaborated below.

Question 05 : Competency 1
Question 06 : Competency 2
Question 07 : Competency 3
Question 08 : Competencies 1 and 3
Question 09 : Competencies 2 and 3
Each question is worth of 20 marks adding up to a total of 60.

Calculation of the final mark : Paper I = 80
Paper II = 120
Final mark = 200 ÷ 2 = 100

*** Facts related to the process in science are presented in gist in page 123**

(34) Science
Paper I

Please note :

* Answer **all** the questions.
* Select the correct or the most suitable answer. (A multiple choice answer sheet will be provided to mark the answers at the examination.)

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1. Of the main biomolecules in living matter, those which are considered to contain the element nitrogen (N) are,

(1) carbohydrates and proteins.
(2) lipids and proteins.
(3) proteins and nucleic acids.
(4) nucleic acids and carbohydrates.

2. What is the electronic configuration of $^{27}_{13}Al$?

(1) 2, 8, 3 (2) 2, 8, 4 (3) 2, 8, 17 (4) 2, 8, 8, 9

3. The image of an object placed in front of a convex mirror is always

(1) inverted.
(2) reduced.
(3) real.
(4) formed in front of the mirror.

4. A cause for gastritis would be

(1) not taking meals on time.
(2) deterring the need of defecation.
(3) drinking water excessively.
(4) low fibre content in the food.

5. Which of the following gives the molecular formulae of ethane, ethene and propane respectively?

(1) C_2H_6, C_2H_4, C_3H_8 (2) C_2H_6, C_3H_8, C_2H_4 (3) C_2H_4, C_2H_6, C_3H_8 (4) C_3H_8, C_2H_6, C_2H_4

6. In which of the following instances the forces are in equilibrium ?

(1) fall of a fruit from a tree
(2) a vehicle running with a constant velocity
(3) a ball rolling on a rough horizontal plane
(4) an object moving down a smooth inclined plane

7. The growth of a plant shoot curving towards the light is a,

(1) positive geotropic movement.
(2) negative geotropic movement.
(3) positive phototropic movement.
(4) negative phototropic movement.

8. Information relating to three elements named A, B and C are given below.

A - used to make transistors and diodes
B - when heated burns with a blue flame issuing a gas
C - when heated burns with a bright flame leaving a white powder

The elements A, B and C respectively are,

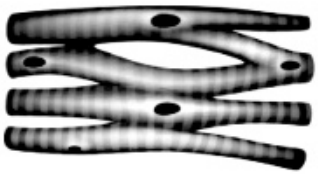
(1) silicon, sulphur and magnesium.
(2) boron, sodium and sulphur.
(3) sodium, boron and magnesium.
(4) silicon, magnesium and sulphur.

9. The figure shows a transparent kettle filed with water. At which inside water point the pressure is equal to that at point A ?

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

10. The following diagram shows two types of tissues in muscle.

A



B

A and B respectively are,

(1) smooth muscles and cardiac muscles.
(2) smooth muscles and a striated muscles.
(3) cardiac muscles and a smooth muscles.
(4) cardiac muscles and a striated muscles.

11. The sulphate of the element X is X_2SO_4. The formula of calcium chlorate is $Ca(ClO_3)_2$. The formula of the chlorate of X is,

(1) $XClO_3$ (2) X_2ClO_3 (3) $X(ClO_3)_2$ (4) $XClO$

12. The device(s) that can be used to obtain a smoothened direct current from an alternate current is/are,

(1) a raectifier diode.
(2) a resistor and a capacitor.
(3) a capacitor and a rectifier diode.
(4) a resistor and rectifier diode.

13. The epithelium of the respiratory tract performs the protective function by acts like secretion of mucus and removal of foreign particles. The first damage caused to this epithelium due to smoking is,

(1) drying of the epithelium due to cease of mucus secretion.
(2) infection of the epithelium due to destruction of cilia.
(3) cease of the epithelial activity due to deposition of tar.
(4) abnormal growth of the cells in the epithelium of the trachea.

- The following table indicates the observations on testing three solutions P, Q and R with litmus. Answer questions **14** and **15** using the information given.

Solution	Red litmus	Blue litmus
P	Red	Turns red
Q	Red	Blue
R	Turns blue	Blue

14. The solutions P, Q and R respectively are,

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

15. Which of the following is the **false** statement about the solution P?

(1) pH value is less than 7
(2) reacts with bases producing a salt
(3) reacts with any metal liberating hydrogen
(4) reacts with any carbonate to produce carbon dioxide

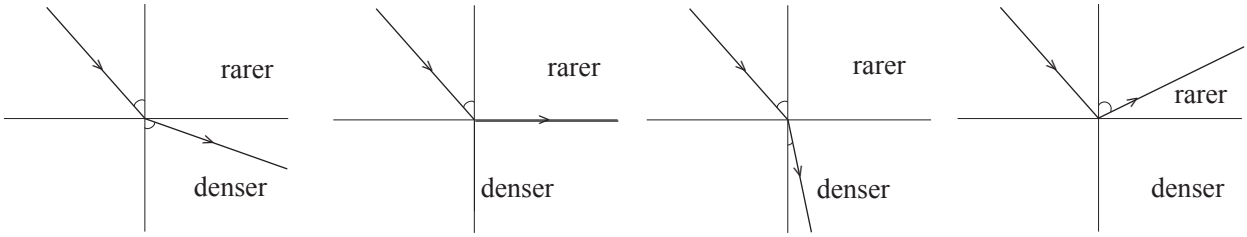
16. Given below are several types of waves.
A - mechanical transverse waves B - mechanical longitudinal waves C - electromagnetic waves
Of the above, the waves which can travel through a gaseous medium are,

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

17. The functions of the epithelial tissues differ according to the place of their occurrence. A place in which the epithelial tissues carry out the function of filtration is

(1) wall of the Bowman's capsule.
(2) wall of the blood capillaries.
(3) inner lining of the wall of the trachea.
(4) inner lining of the wall of the alimentary canal.

18. Which diagram correctly shows the refraction of a ray entering a denser medium from a rarer medium ?



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

19. Which option in the following table correctly gives an organelle of a cell and its function ?

	Organelle	Function
(1)	endoplasmic reticulum	controlling life functions
(2)	Golgi body	maintaining water balance
(3)	nucleus	protein synthesis
(4)	mitochondrion	production of energy

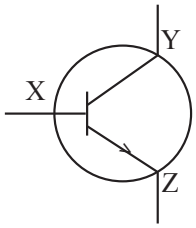
20. Given below is a table containing experimental information about the electrical conductivity of some substances.

Substance	Conduction of electricity	
	Solid state	Fused state
A	No	Yes
B	No	No
C	Yes	Yes

Of A, B and C the ionic compound(s) is/ are,

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

21. The diagram indicates the circuit symbol of a transistor. Which of the following correctly indicates the collector terminal and the transistor type?



(1) Z and pnp
(2) Y and pnp
(3) Z and npn
(4) Y and npn

22. Given below are some functions of the human brain.

A - maintaining balance of the body
B - controlling the rate of the heart beat
C - controlling responses such as cough and sneezing

Of these, the functions controlled by the brain stem (medulla oblongata) are,

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

23. Four experiments named P, Q, R and S conducted by a group of students are as follows.

P - heating iron powder with sulphur

Q - heating potassium permanganate

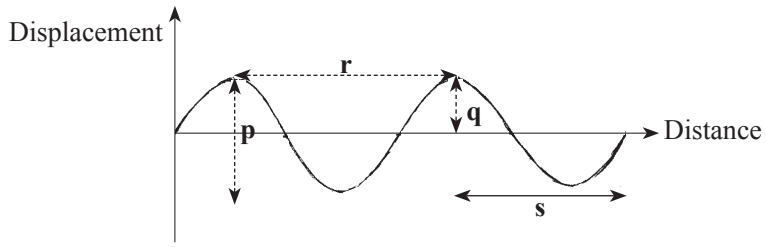
R - keeping a clean iron nail immersed in a solution of copper sulphate

S - mixing a calcium chloride solution with a sodium carbonate solution

Which of the following answers indicates the types of reactions happening in experiments P, Q, R and S ?

	P	Q	R	S
(1)	combination	decomposition	single displacement	double displacement
(2)	single displacement	combination	decomposition	double displacement
(3)	combination	combination	double displacement	single displacement
(4)	combination	decomposition	double displacement	single displacement

24. Given below is a graphical illustration of a wave motion at a certain moment.



In this wave, the amplitude and wave length are represented respectively by,

(1) p and r. (2) p and s. (3) q and r. (4) q and s.

25. The correct statement about the sexually transmitted diseases is that the causative agents of them

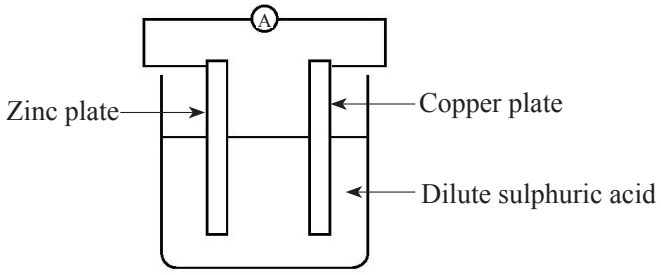
(1) are transmitted only by a sexual relationship.

(2) produce symptoms only on sex organs.

(3) are transmitted by a sexual relationship or through body fluids.

(4) cannot be removed from the body by medicines or immunisation.

26. The following diagram shows a set up of a simple cell.



Which of the following is the true statement about this set up ?

(1) Copper plate is the positive terminal and oxidation occurs at it.

(2) Copper plate is the negative terminal and reduction occurs at it.

(3) Zinc plate is the positive terminal and reduction occurs at it.

(4) Zinc plate is the negative terminal and oxidation occurs at it.

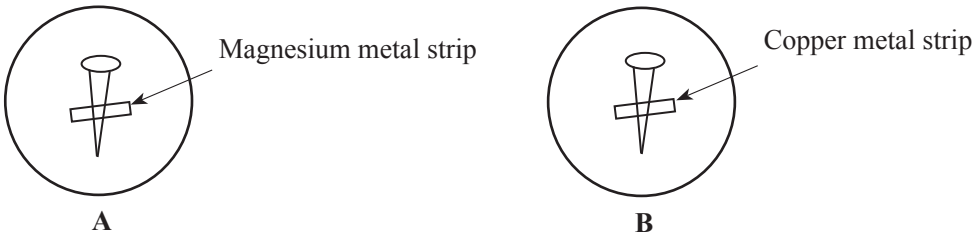
27. The frictional force that changes with the variable force acted on a body is called,

(1) dynamic frictional force.
(2) static frictional force.
(3) limiting frictional force.
(4) static and dynamic frictional force.

28. Which of the following is **not** an instance which utilizes gene technology directly ?

(1) detection of criminals
(2) breeding cattle producing milk with high nutritious value
(3) minimizing environmental pollution caused by spillage of mineral oil
(4) cultivating on a large scale the plant types which do not reproduce sexually

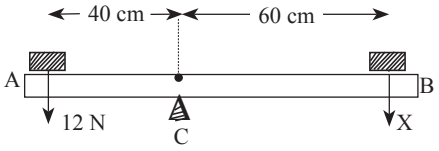
29. Given below is a set up where two clean, identical iron nails are kept in contact with two metal strips and dipped in a medium of jelly containing potassium ferricyanide and phenolphthalein.



Which of the following is the correct observation about the colours that can be obtained from the above settings?

	A		B	
	around the iron nail	**around the metal strip**	**around the iron nail**	**around the metal strip**
(1)	blue	pink	pink	blue
(2)	pink	no colour change	blue	pink
(3)	pink	no colour change	pink	blue
(4)	pink	blue	no colour change	pink

30. A light, uniform rod AB of length 1m is kept in balance on a knife edge by two forces 12 N and X. The magnitude of the force X at this instance is,



(1) 6 N. (2) 8 N.
(3) 10 N. (4) 12 N.

31. The following are some characteristics belonging to flowering plants.

A - presence of a fibrous root system
B - reticulate venation in leaves
C - presence of a thick cuticle in leaves
D - unbranched stem

Of the above, the characteristics that help identify monocotyledonous plants are,

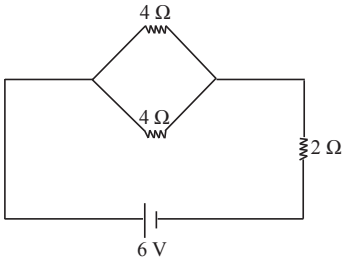
(1) only A and B.
(2) only B and C.
(3) only C and D.
(4) only A and D.

32. The mass of a ^{12}C atom is 1.99×10^{-23} g and the mass of a Mg atom is 4.03×10^{-23} g. The relative atomic mass of a Mg atom is,

(1) $\frac{4.03 \times 10^{-23}}{1.99 \times 10^{-23}}$ (2) $\frac{1.99 \times 10^{-23}}{4.03 \times 10^{-23}}$

(3) $\frac{4.03 \times 10^{-23}}{1.99 \times 10^{-23} \times 12}$ (4) $\frac{12 \times 4.03 \times 10^{-23}}{1.99 \times 10^{-23}}$

33. In the following circuit, the total current provided by the cells is,



(1) 0.2 A. (2) 0.6 A. (3) 1.0 A. (4) 1.5 A .

34. Consider the following statements.

A - creating a greater tendency to give birth to children with genetic disorders

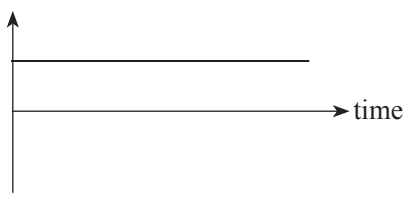
B - all children born having hereditary disorders

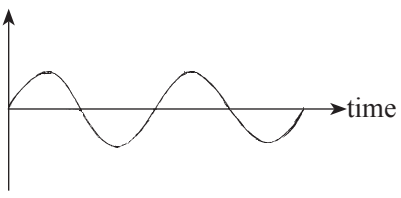
C - possibility of transmitting human genetic disorders to future generations

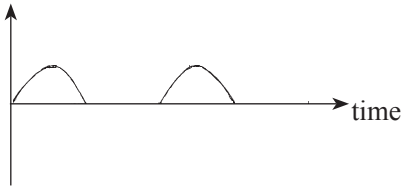
Of these, the correct statements that confirm the fact that the marriages among blood relatives is **not** suitable are

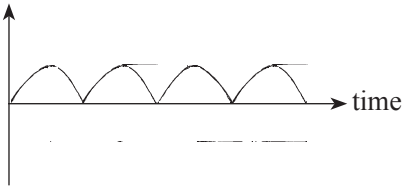
(1) only A and B. (2) only B and C. (3) only A and C. (4) all A, B and C.

35. Which graph indicates the variation of the induced electromotive force of a bicycle dynamo with time ?

(1) 

(2) 

(3) 

(4) 

36. Some unfavourable effects on the environment resulted by environmantal pollution are given below.

A - global warming

B - decrease in visibility in air

C - hindering production of food in plants

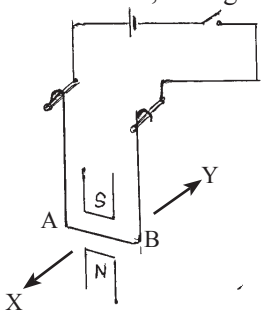
Of these the unfavourable effects brought about by the photochemical smog are,

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

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

37. The diagram shows how a freely suspended wire frame is connected to an electrical circuit with a switch. Perpendicular to the horizontal arm AB of the frame, a magnetic field is imposed vertically. When the switch is closed the arm AB will,

(1) move to X direction.
(2) move to Y direction.
(3) rotate anticlockwise.
(4) rotate clockwise.



38. Which of the following measures could be considered the best to be adopted at home for waste management ?

(1) burning wastes collected at home
(2) classifying domestic wastes and disposing
(3) refraining from waste producing acts at home
(4) using plastic bottles in place of glass bottles

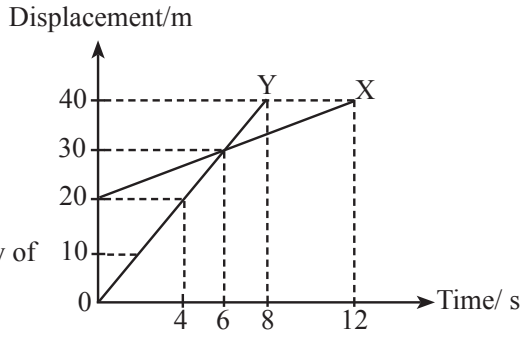
39. Given below are the relative atomic masses of some elements.
H = 1 C = 12 O = 16 Mg = 24

According to the above values which of the following relationships is **false** ?

(1) amount of moles of atoms in 12 g of carbon = amount of moles of atoms in 24g of magnesium
(2) amount of moles of atoms in 24 g of magnesium = amount of moles of molecules in 18g of water
(3) number of atoms in 12g of carbon = number of atoms in 24g of magnesium
(4) number of atoms in 24 g of magnesium = total number of atoms in 18g of water

40. The diagram shows displacement-time graphs relating to the motion of two objects X and Y. The correct information that can be drawn from these graphs is that,

(1) the velocities of the two objects are equal at the sixth second.
(2) the displacements of the two objects are equal after four seconds.
(3) the distance travelled by the two objects is equal after six seconds.
(4) the velocity of the object Y is greater than the velocity of the object X.



* * *

(34) Science

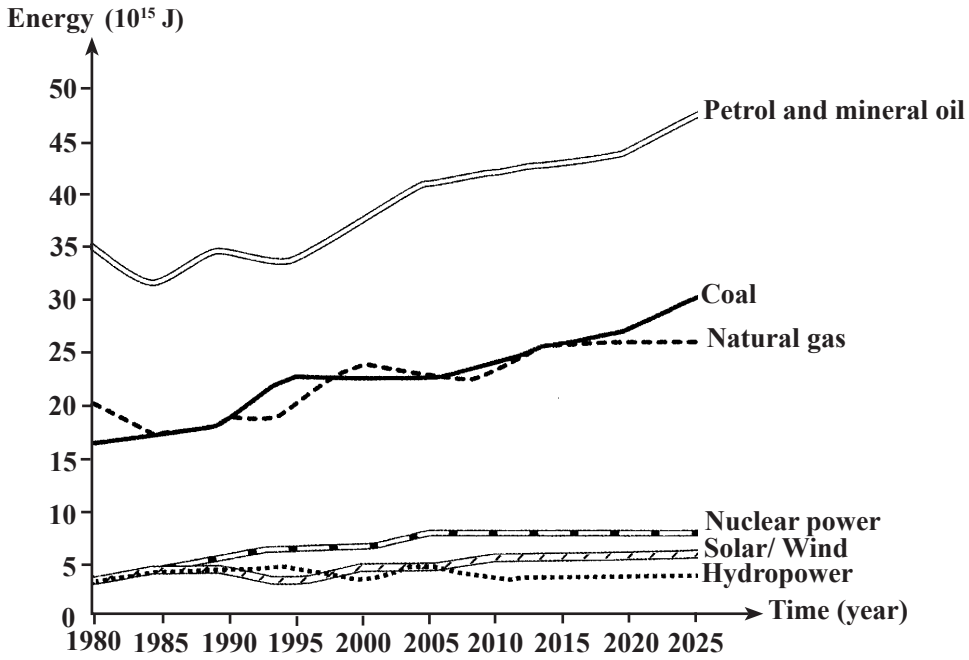
Paper II

Please Note :

* Answer **all** the questions in Part **A** in this paper itself.
* Answer only **Three** questions from five questions in Part **B**.

Part A

1. (A) The following graph indicates the amounts of energy consumed and supporsed to be consumed in the future by a developed country against time.



(i) Of the renewable and non renewable energy sources, which type of sources does this developed country use more to produce energy ?

..... (01 mark)

(ii) State one environmental problem caused by the consumption of energy produced by a method such as the one you stated in (i) above.

.....

(01 mark)

(iii) According to the graph, name one source for energy whose consumption would increase rapidly in the future.

.....

(01 mark)

(v) (a) Name one renewable source of energy given in the above graph which you suggest to use on a wider basis in the future in a country like Sri Lanka.

..... (01 mark)

(b) State one problem that would arise when using that source.

.....

(01 mark)

(B) The following table indicates the amount of carbon dioxide released to the atmosphere due to the consumption of fuel by the domestic and commercial fields in Sri Lanka within an year.

	Field	Amount of carbon dioxide in Gigagrams (Gg)
01	Generation of electricity	3015.34
02	Industries	842.03
03	Transport	5058.19
04	Domestic and commercial sites related	1195.70
05	Cleaning purposes	268.25

(i) Which field has contributed most to release carbon dioxide ?

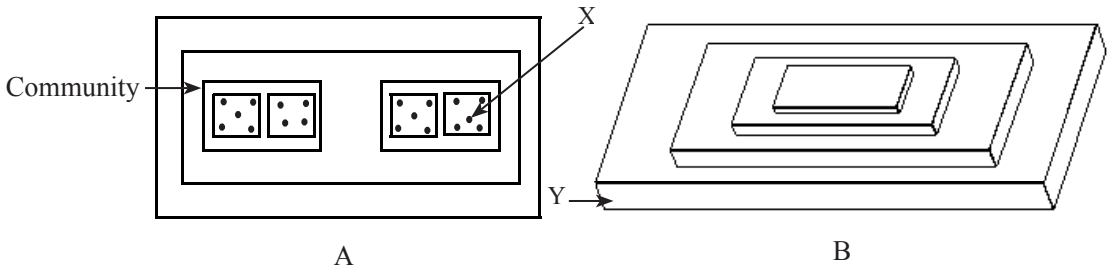
..... (01 mark)

(ii) Suggest a method that can be implemented to reduce the contribution of the transport for the carbon foot print.

.....

(01 mark)

(C) Figures A and B indicate two models proposed to illustrate how organisational levels in the biosphere and the trophic levels in an eco-system are organised.



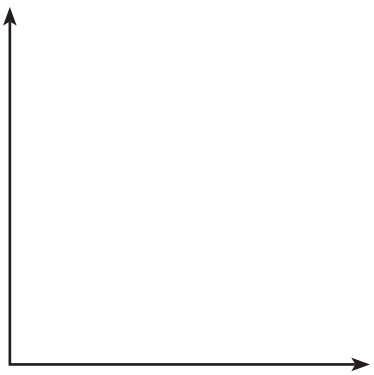
(i) What is depicted by the model shown in figure A ?

..... (01 mark)

(ii) Name X and Y belonging to the A and B models.

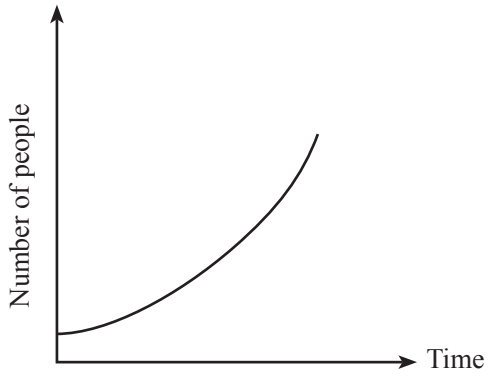
X ..... Y ..... (02 marks)

(D) (i) "The number of a organisms in a population increases with time according to some pattern and becomes a constant." Draw the typical growth curve that can be seen in relation to a population.



(02 mark)

(ii) The growth curve of a human population is indicated below.



(a) What is the reason for the above shape of the human population growth curve ?

.....

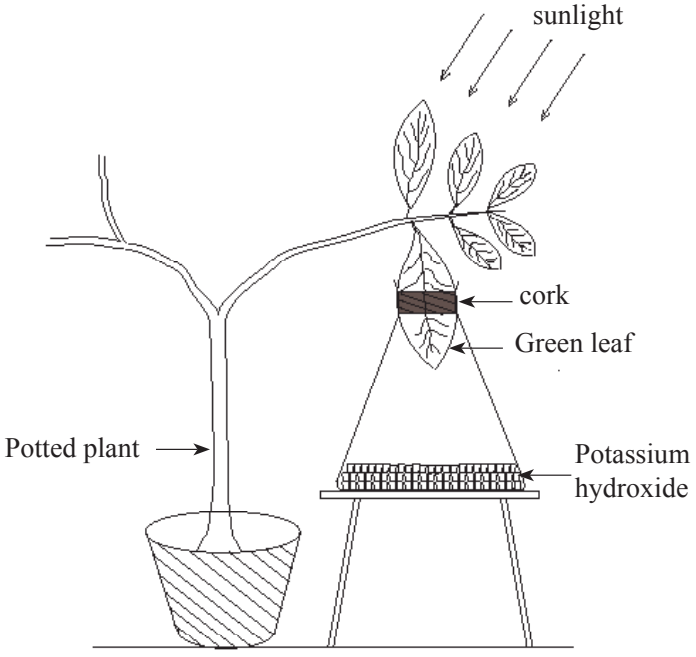
(02 marks)

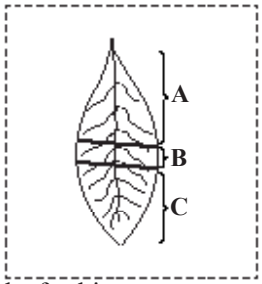
(b) How does the typical growth curve differ from the human population growth curve ?

.....(01 mark)

(Total marks 15)

2. (A) Given below is an experimental set up arranged to investigate the factors essential for photosynthesis using a potted plant kept in the dark for 48 hours. Later, this set up was exposed to sunlight for about 5 hours and the leaf in the flask was tested for starch.





leaf subject to starch test

(i) Of parts A, B and C, which part/ parts stain(s) blue-black when subject to the iodine test for starch ?

.....

(01 mark)

(ii) What factor/ factors essentials for photosynthesis was/ were studied here ?

.....

(01 mark)

(iii) State a reason for each of the following practices followed in the above experiment.

(a) keeping the leaf for about two days in the dark

.....

(01 mark)

(b) placing potassium hydroxide in the flask

.....

(01 mark)

(B) An experiment conducted by a student to examine the action of amylase enzyme on starch is as follows.

- A solution was prepared by adding starch dud amylase to an aqueous medium. Then after the times indicated in the table below. A drop of the solution was taken out and examined after adding a drop of iodine solution. The following table gives how the colour of the iodine solution changed with time.

Colour	Blue-black	Bluish	Brownish	Yellowish brown	Yellowish brown
Time/ min.	t_1	t_2	t_3	t_4	t_5

(i) State a reason for each of the above observations made at respective times.

t_1 .....

t_4 .....

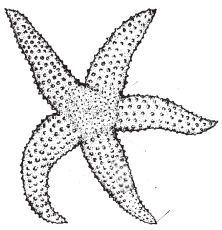
(02 marks)

(ii) Name a substance that may be present in the mixture after time t_5.

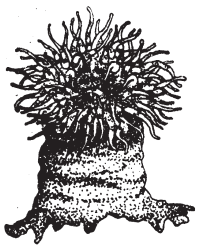
.....

(01 mark)

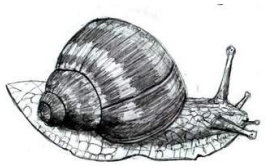
(C) (i) Diagrams of some organisms are indicated below.



A

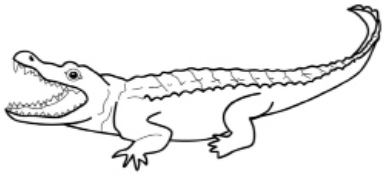


B



C

D



E

Write the letter/ letters corresponding to the organism(s) having the following characteristics against each.

(a) Radial symmetry - .....

(b) Having a vertebral column - .....

(c) Presence of an exoskeleton - .....

(d) Presence of jointed appendages - .....

(e) Presence of a muscular foot - .....

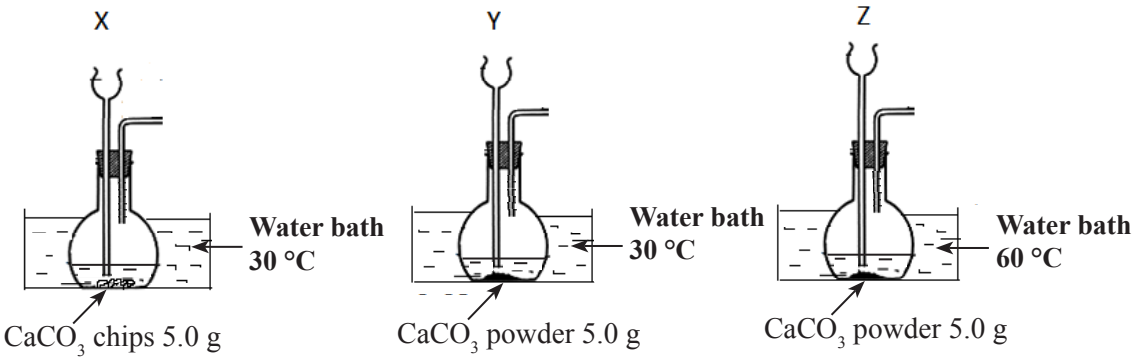
(f) Leading a sedentary life - ..... (06 marks)

(ii) Name the kingdom to which the above organisms belong.

.....(01 mark)

(Total marks 15)

3. Three set ups of apparatus arranged for comparing reaction rates with 50 cm^3 of hydrochloric acid solutions of concentration 1mol dm^{-3} in each are given below.



(i) What factor affecting the rate of the above reaction was studied by.

(a) the pair X and Y ? .....

(b) the pair Y and Z ? ..... (02 marks)

(ii) What observation will you use to compare the reaction rates in Y and Z ?

..... (01 mark)

(iii) In addition to the two factors stated in (i) (a) and (b) above, write another factor that affects the rate of this reaction.

..... (01 mark)

(iv) If the set up Z along with Y is used to investigate the effect of the factor stated in (iii) above, write two changes that should be made.

....

(02 marks)

(v) During this activity carbon dioxide gas is evolved as a product. Draw the Lewis structure of a molecule of that gas.

(02 marks)

(vi) Write the balanced chemical equation for the reaction taking place inside the flask.

.....

(01 mark)

(vii) If all the calcium carbonate used in set up X was used up for the reaction, what is the amount of moles of carbon dioxide produced during the reaction ?
(Ca = 40, C = 12, O = 16)

.....

.....

(02 marks)

(viii) The energy change ($\triangle H$) of the reaction taking place between calcium carbonate and hydrochloric acid is -61 kJ mol^{-1}.

(a) Is this reaction exothermic or endothermic ?

.....

(01 mark)

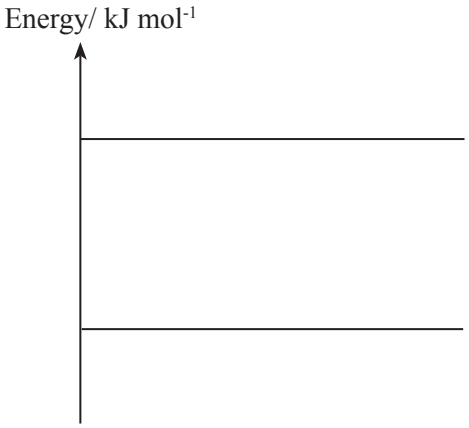
(b) Give reasons for your answer.

.....

.....

(01 mark)

(ix) Complete the following energy diagram with regard to the reaction taking place between calcium carbonate and hydrochloric acid.

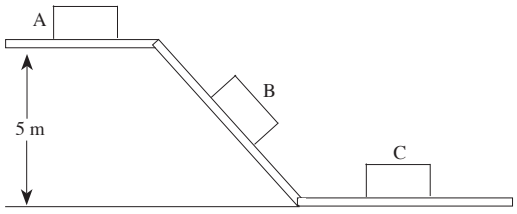


(02 marks)

(Total marks 15)

4. An inclined plane is used to remove bricks from a storeyed building. A, B and C show three situations of a brick so removed.

A - The brick at rest on the upper storey
B - The brick moving down along the smooth gutter
C - The brick at rest on the ground



(i) Name the Newton's laws that can be related to each of the following situations.

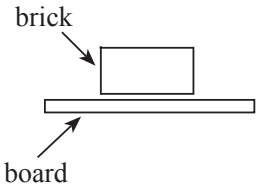
(a) To explain about the forces acting on the brick at position A.

..... (01 mark)

(b) To explain the motion of the brick at position B parallel to the inclined plane.

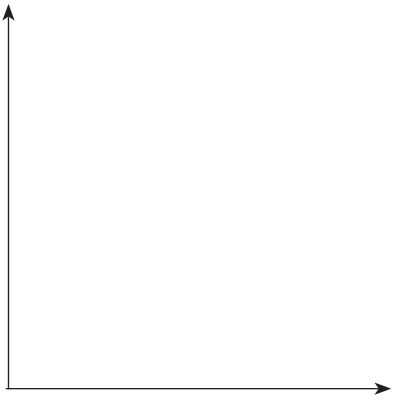
..... (01 mark)

(ii) In the following diagram mark the action and reaction acting on the brick at position C.



(02 marks)

(iii) Sketch the displacement-time graph relevant to the movement of the brick along the smooth gutter. (Assume that the brick started to move from the state of rest.)



(02 marks)

(iv) What is the advantage of sending the bricks down a gutter as is done above ?

.....

(01 mark)

(v) Of a rough gutter and a smooth gutter, which is more suitable for this task ? What is the reason for your answer ?

Suitable gutter : .....

Reason : .....

(02 marks)

(vi) If the mass of a brick is 2 kg, calculate the potential energy of the brick at position A.
($g = 10\ ms^{-2}$)

.....

.....

.....

(02 marks)

(vii) Write the conversion of energy taking place when the brick moves down the smooth inclined plane.

.....(01 mark)

(viii) Calculate the velocity of the brick at the bottom of the inclined plane.

.....

.....

.....

(02 marks)

(ix) State the assumption you made for your calculation in part (viii) above.

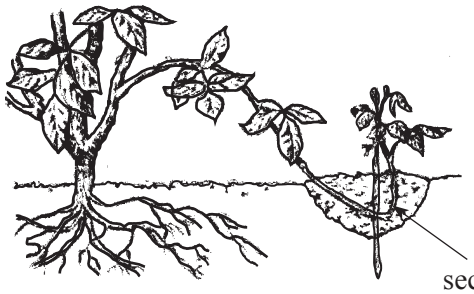
.....(01 mark)

(Total marks 15)

* *

Part A

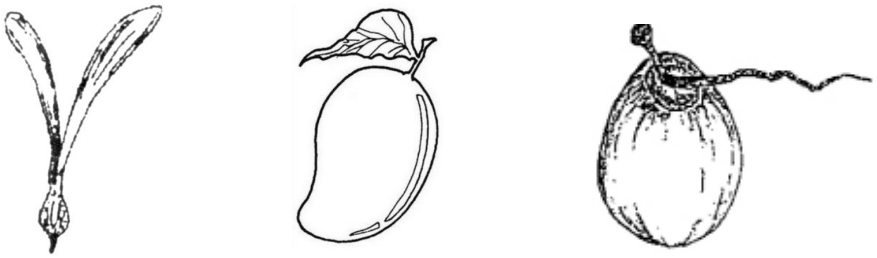
05. (A) Given below is a diagram of a jasmin (samanpichcha) plant treated to obtain another plant from it easily.



(i) What is the name of the above method of propagating plants ? (01 mark)

(ii) In order to get a plant successfully, state a change that should be made in the branch of jasmin before burying it under soil. (02 marks)

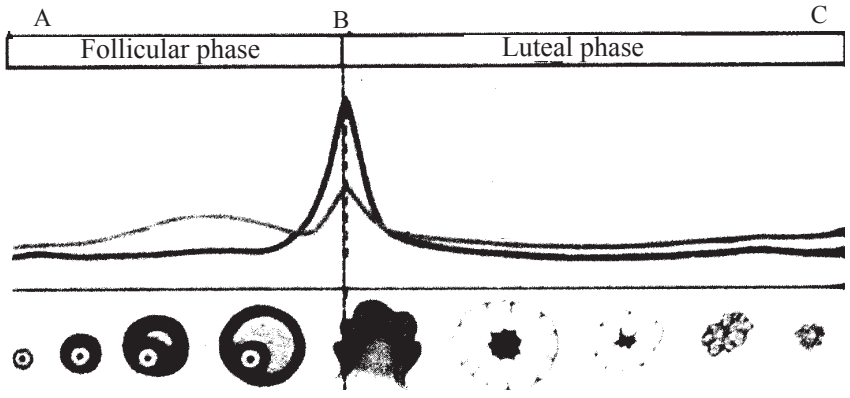
(iii) Diagrams of three kinds of fruits and seeds that are dispersed by different methods are given below.



State with the relevant letter, the method by which each of those fruits or seeds disperse.

(03 marks)

(B) Given below is an illustration of the menstrual cycle occurring in the reproductive system of a sexually mature female.



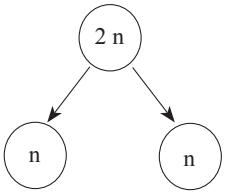
(i) In the above figure, which phase comes next to C if no fertilization occurs ? (01 mark)

(ii) According to the above figure, during the period between which two letters can a fertilization occur ? (01 mark)

(iii) What special event occurs in the ovary in the occasion of B ? (01 mark)

(iv) What time is spent for a single menstrual cycle taking place from A to C ? (01 mark)

(C) The diagram presents a certain event in the gametogenesis of organisms.



(i) State an importance of this type of a division. (02 marks)

(ii) The number of pairs of chromosomes in a somatic cell of a human is indicated as 22 + xx or 22 + xy. Of them what are meant by 22 and xx, xy ? (02 marks)

(D) The blood pumped from the human heart circulates in two routes, systemic and pulmonary.

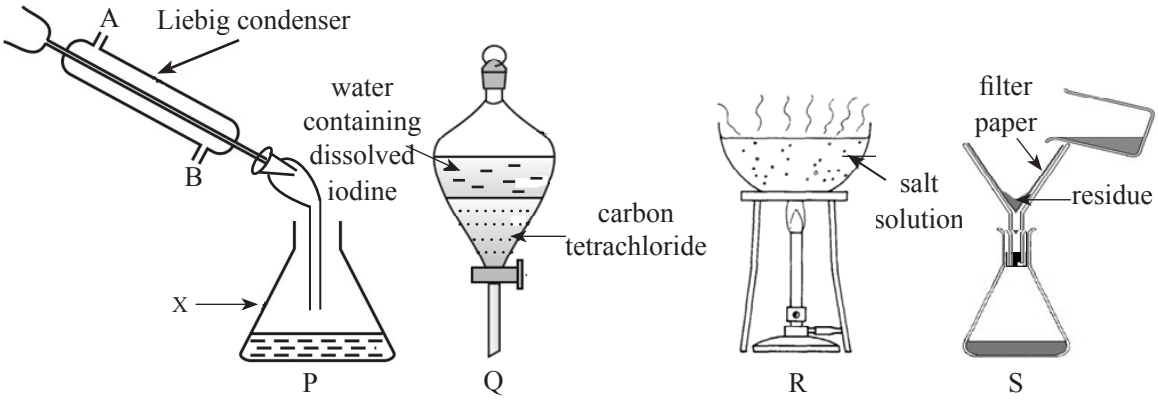
(i) State two differences between the systemic circulation and the pulmonary circulation. (02 marks)

(ii) Sometimes a blood clot may block a blood vessel in the brain leading to destruction of nerve cells. State a complaint resulted by this. (02 marks)

(iii) When a hormone extract was administered to a child with suppressed height, the height became normal. Name this hormone and the gland of a healthy person which produces it. (02 marks)

(Total marks 20)

06. (A) The diagram below illustrates several methods used to separate components in mixtures.



(i) Name the methods indicated by P, Q, R and S used to separate components in mixtures. (04 marks)

(ii) State one use of P. (01 mark)

(iii) When separating components by method P, the liquids collected in the vessel X separate into two layers. State a reason for this separation. (02 marks)

(iv) In the method P, from which opening does the water enter the Liebig condenser ? State the reason for it. (02 marks)

(B) (i) Of polar and non polar solvents, to which category does the carbon tetrachloride solvent used in method Q belong ? (01 mark)

(ii) As regards the solute iodine, what is the advantage of using carbon tetrachloride as the solvent in Q ? (01 mark)

(C) Two conditions considered essential for an area to locate a saltern are as follows.

(a) clayey soil

(b) dry and windy weather throughout the year

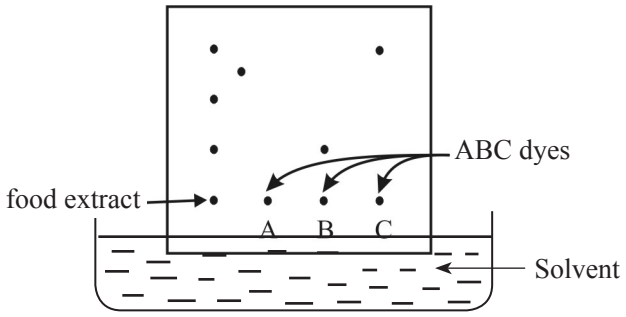
(i) State for what reason are the above conditions (a) and (b) essential ? (02 marks)

(ii) Salt crystals can aso be obtained by the method R. How does the salt producing method in a saltern differ from the method R ? (01 mark)

(iii) The solution used in R was prepared by dissolving 1.0 mol of sodium chloride in 162.0 g of water. Calculate the mole fraction of sodium chloride in this solution. (H = 1, O = 16)

(03 marks)

(D) The following diagram illustrates a method used to examine whether the dyes A, B and C are present in a food extract.



(i) What is the name of this method ? (01 mark)

(ii) According to this result, what dyes of A, B and C could be present in the food sample ?

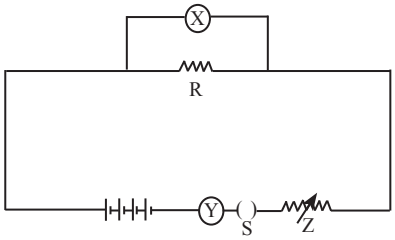
(02 marks)

(iii) Except the identification of dyes in food stuffs, state another use of the above method.

(01 mark)

(Total marks 20)

07. (A) The diagram shows a set up of an experiment planned by students. It aims to study how an electric current (I) flowing through a resistor (R) varies with the potential difference (V).



(i) Name the devices X and Y. (02 marks)

(ii) What is the function of Z ? (01 mark)

(iii) After every time a reading is taken, the switch S is opened. What is expected from it ?

(01 mark)

(iv) Sketch a graph that indicates the relationship between the readings taken by X and Y.

(02 mark)

(v) While the experiment is conducted it is assumed that some physical conditions remain constant. State such a physical condition. (01 mark)

(B) The following table indicates the characteristics of the image formed against the object distance '*u*' of an object placed in front of a lens.

Situation	Object distance (*u*)/ cm	Characteristics of the image
A	15	virtual, larger than the object, erect
B	50	real, larger than the object, inverted
C	70	real, equal to the object in size
D	90	real, smaller than the object in size

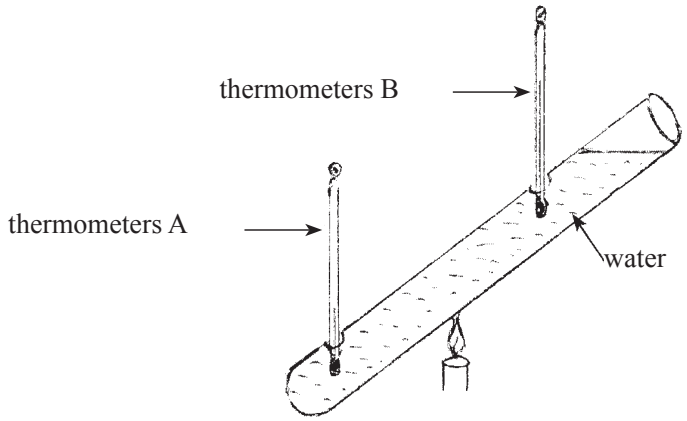
(i) What is the focal length of this lens ? (02 marks)

(ii) Draw the ray diagram relevant to situation B above. (03 marks)

(iii) Name an optical instrument that uses situation A. (01 mark)

(iv) Name the type of the mirror that can be used to obtain the very same characteristics of the images given in the table above. (01 mark)

(C) The following diagram shows a piece of equipment made by fixing two thermometers into two holes of a glass tube containing water. Leakage of water through the holes is prevented. The water is heated by a flame placed under the tube between the two thermometers A and B.



(i) According to the observations made, the temperature of B increases considerably. But the increase in the temperature in A is slight. Explain the reason for this observation. (03 marks)

(ii) The temperature in the thermometer B gradually increases and at a certain moment stays steady even though the heat is supplied. State a change that can occur in water on that occasion. (01 mark)

(iii) A beaker contains 0.2 kg of water. The temperature of it was increased from 30 °C to 145 °C. Find the quantity of heat supplied for this from the burner. (Assume no heat is lost to the surroundings). (specific heat capacity of water is 4200 J kg^{-1} $°C^{-1}$, thermal capacity of the beaker is 120 J $°C^{-1}$) (03 marks)

(Total marks 20)

08. (A) During the process of inhalation and exhalation of humans we know that the muscles in the diaphragm contract and relax.

(i) Indicate two changes that occur in the thoracic cavity as a result of the contraction of muscles in the diaphragm. (02 marks)

(ii) In aerobic respiration a part of energy is released as heat. The rest is stored as chemical energy.

(a) As what chemical compound is the chemical energy stored in the bodies of organisms ? (01 mark)

(b) Write the balance chemical equation for the aerobic respiration. (02 marks)

(B) The removal of unwanted products produced during metabolic activities from the body is called excretion. Kidney is an excretory organ and it produces urine.

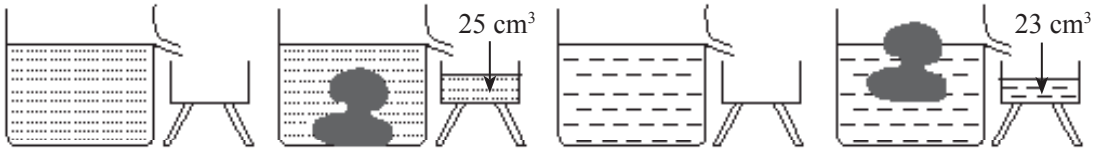
(i) Name an excretory product found in urine. (01 mark)

(ii) What component should be completely reabsorbed during the filtration of urine ? (01 mark)

(iii) What is the result of crystallisation of salts like calcium oxalate in the kidneys or the urinary bladder ? (01 mark)

(iv) State **two** measures that can be taken to minimize that situation. (02

(C) Four stages of an activity conducted to find the mass and the volume of an irregular solid object are indicated below. (Density of water = 1000 kg m^{-3}, density of coconut oil = 900 kg m^{-3}, g = 10 m s^{-2})



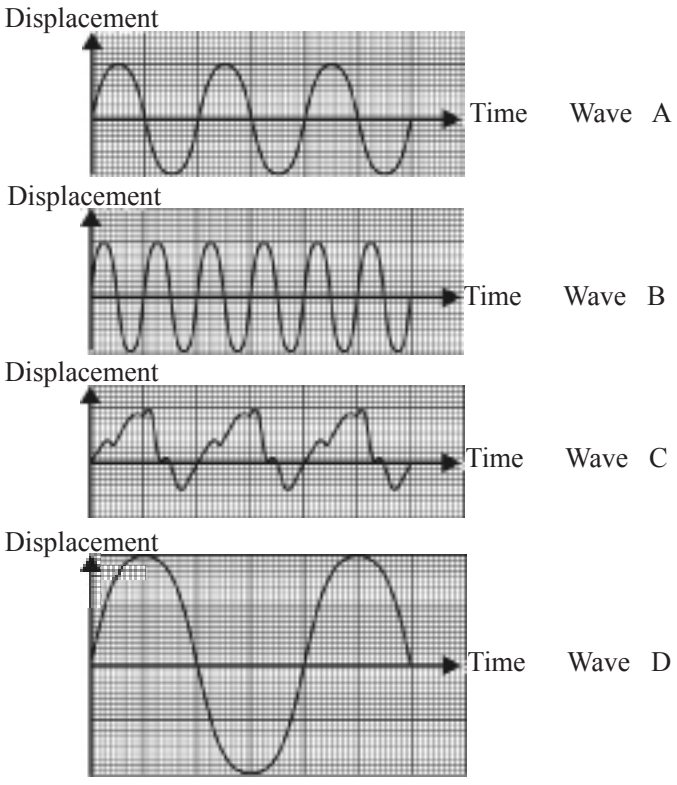
Stage I	Stage II	Stage III	Stage IV
before immersing the object in coconut oil	after immersing the object in coconut oil	before immersing the object in water	after immersing the object in water

(i) (a) According to the information above, Indicate respectively the stages by which the volume and mass of the object can be determinded. (02 marks)

(b) calculate the density of the irregular object. (02 marks)

(ii) What is the reason for the change in position of the object in stage II and stage IV ? (02 marks)

(D) The wave types produced during the playing of four musical instruments are given below.



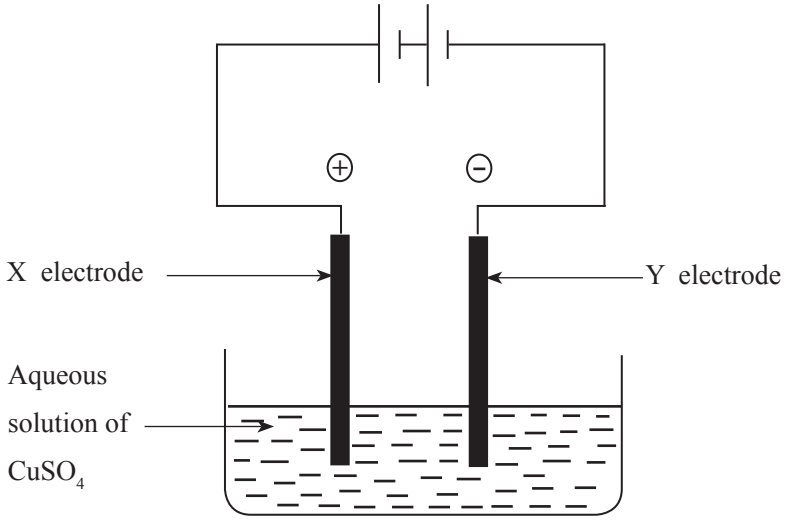
(i) What characteristic of sound is evident when the wave types A and B are compared ? (01 mark)

(ii) A gives the wave pattern produced when the note 'Sa' (doh) is played by a flute. What wave pattern is expected to be produced if the same note is played by another string instrument ? (01 mark)

(iii) What is the wave of highest loudness ? What is the physical quantity that helped identify it ? (02 marks)

(Total marks 20)

09. (A) The following diagram indicates an arrangement set up to electrolyse an aqueous solution of the salt copper sulphate.



(i) X and Y are two inert electrodes made of the same material. Name a material that is suitable to be used as those electrodes. (02 marks)

(ii) Write the formulae of the ions present in the aqueous solution of copper sulphate. (02 marks)

(iii) Write the balanced chemical equation for the half reaction taking place at Y electrode and indicate whether it is an oxidation or reduction. (02 marks)

(iv) Name the anode of the above apparatus. (01 mark)

(v) Write two observations you can make during this process of electrolysis. (02 marks)

(vi) State two occasions in which electrolysis is applied industrially. (02 marks)

(B) Water is stored in a tank made by damming a stream. It has been planned to rotate a turbine with that water and produce electricity. The mass of water in the fully filed tank is 6000 kg. The tank is situated 10 m above the level of he turbine. ($g = 10\ ms^{-2}$)

(i) What is the gravitational potential energy of the water stored in the tank ? (02 marks)

(ii) During the generation of electricity 10 minutes elapsed to empty the tank completely. Calculate in standard units the rate of supply of energy from water to the turbine. (Assume no loss of energy took place during the flow of water.) (02 marks)

(iii) The voltage produced by that electricity generator is 240 V. It is reduced to 12 V by a transformer and used to light filament bulbs.

(a) What type of a transformer is used for this ? (01 mark)

(b) It has been marked 12 A, 2 V on a filament bulb. What is the power of that filament bulb ? (02 marks)

(iv) If 5 such bulbs were lighted 5 hours per day, calculate the number of units of electricity spent for 10 days. (A unit of electricity is one kilowatt hour.) (03 marks)

(Total marks 20)

* * *

Preparing Questions in relation to the process of Science

- One of the highlights in designing the grades 6-11 Science curriculum was to plan the activities giving prominence to the skills that are related to the process of science. Thereby it is expected to accustom the students who develop skills to apply the Scientific method to solve problems.
- As regards the evaluation carried out through a written test, the first structured question is designed to inquire into how far the students have mastered the process of Science.
- The components circumscribed within the ambit of the science process can be very briefly indicated as follows.

(1)	Classifying	-	Sequencing or grouping of given information, event, items, materials or objects according to an order
(2)	Creating models	-	Representing pictorially the data and information using graphs, charts, tables, three dimensional models etc.
(3)	Generalising	-	Combining several specific facts learnt and presenting them in a summarized form.
(4)	Identifying variables	-	Identifying characteristics that remain unchanged (constant) under various conditions in an activity related to substances or factors.
(5)	Inferring	-	Arriving at decisions explaining reasons for observations.
(6)	Interpreting data	-	Analysing data and information and organizing them to highlight the relationships among them
(7)	Decision Making	-	Selection of the best out of several alternatives based on reasoning
(8)	Manipulating Materials	-	Handling materials and equipment effectively and skillfully
(9)	measuring	-	Taking quantitative measurements in accordance with a standard.
(10)	Observing	-	Identifying qualitative differences associated with a given object or an event.
(11)	Predicting	-	Forecasting about the future having taken the prevailing conditions into consideration
(12)	Recording data	-	Collecting data related to an entity or an event.
(13)	Replicating	-	Reusing or reproducing the process or the sequence once learned.
(14)	Mathematical Operation	-	Making calculations using basic quantities applying mathematical formulae and laws.
(15)	Formulating Hypotheses	-	Making a statement that can be studied about an event based on reason.

The stages of the above process are spread throughout the syllabus and they can be tested by any unit. In spite of the fact that this evaluation is suggested under unit 4 for the examination, it can be used in any other occasion also.