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கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2017 டிசெம்பர்
General Certificate of Education (Ord. Level) Examination, December 2017

විද්‍යාව I
விஞ்ஞானம் I
Science I

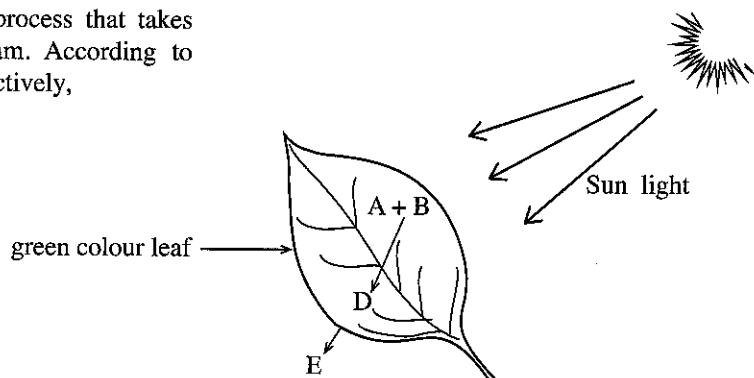
පැය එකයි
ஒரு மணித்தியாலம்
One hour

Note :

- Answer *all* questions.
- In each of the questions 1 to 40, pick one of the answers (1), (2), (3), (4) which you consider as *correct* or *most appropriate*.
- Mark a cross (X) on the number corresponding to your choice in the answer sheet provided.
- Further instructions are given on the back of the answer sheet. Follow them carefully.

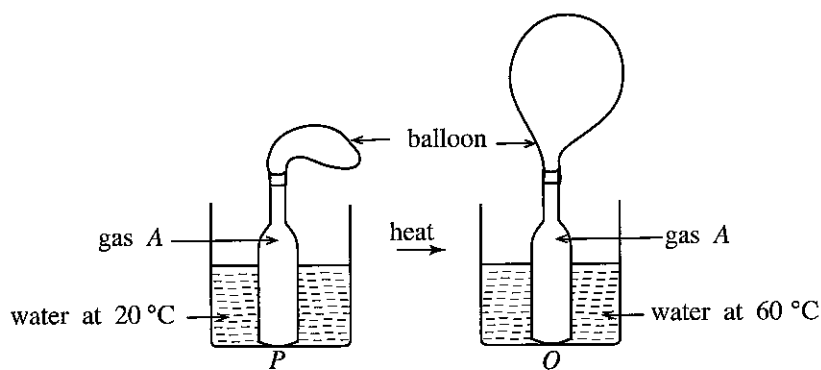
- Which of the following plants has leaves with reticulated venation?
(1) Chillies (2) Coconut (3) Paddy (4) Bamboo
- Some features of the body of an animal are given below.
A - Presence of chaetae
B - Body comprises of three layers
C - Presence of bilateral symmetry
This animal having the above features belong to phylum,
(1) Coelenterata. (2) Annelida. (3) Mollusca. (4) Arthropoda.
- Which of the following is a warm-blooded animal?
(1) Crocodile (2) Toad (3) Tortoise (4) Kingfisher
- The largest organelle, present in an animal cell is
(1) Nucleus. (2) Ribosome. (3) Golgi bodies. (4) Mitochondrion.
- Which of the following diseases can be prevented by the vaccine B.C.G.?
(1) Pneumonia (2) Laryngitis (3) Tuberculosis (4) Bronchitis
- The information related to a biological process that takes place in a plant is given in the diagram. According to the diagram, A, B, D and E are, respectively,

- CO_2 , H_2O , $\text{C}_6\text{H}_{12}\text{O}_6$ and O_2
- O_2 , H_2O , $\text{C}_6\text{H}_{12}\text{O}_6$ and CO_2
- H_2O , $\text{C}_6\text{H}_{12}\text{O}_6$, CO_2 and O_2
- CO_2 , $\text{C}_6\text{H}_{12}\text{O}_6$, O_2 and H_2O



- Past pupils of a school decided to donate blood to a teacher who had undergone an urgent surgery. If her blood group is A, the persons belonging to which of the following blood groups can donate blood?
(1) A and AB (2) B and AB (3) A and O (4) AB and O

8. Saman can see close-by objects clearly. But he cannot see the distant objects clearly. Select the option that gives the defect of his vision and the remedy that must be taken to overcome the defect.
- (1) Long sight, wearing spectacles with convex lenses
 - (2) Long sight, wearing spectacles with concave lenses
 - (3) Short sight, wearing spectacles with convex lenses
 - (4) Short sight, wearing spectacles with concave lenses
9. A diagram relevant to a reflex arc is given below.
- Skin $\rightarrow$ **A** $\rightarrow$ spinal code $\rightarrow$ **B** $\rightarrow$ muscles
- A and B are, respectively,
- (1) sensory neurone and motor neurone.
 - (2) sensory neurone and intermediate neurone.
 - (3) motor neurone and sensory neurone.
 - (4) intermediate neurone and motor neurone.
10. Which of the following seeds is dispersed by explosive mechanism?
- (1) Orchid
 - (2) Balsam
 - (3) Thuththiri
 - (4) Vara
11. Which of the following is **not** a hereditary disease in humans?
- (1) Haemophilia
 - (2) Colour blindness
 - (3) Thalassemia
 - (4) Gonorrhoea
12. Consider the following hormones.
- A - Glucogon B - Cortisol C - Insulin D - Adrenalin
- The hormones which mainly contribute in maintaining the glucose level in the blood at optimum-level are
- (1) A and B.
 - (2) A and C.
 - (3) B and C.
 - (4) A and D.
13. The element X belongs to the group three in the periodic table.
- The chemical formula of sulphate of X is
- (1) XSO_4
 - (2) X_2SO_4
 - (3) $\text{X}_2(\text{SO}_4)_3$
 - (4) $\text{X}_3(\text{SO}_4)_2$
14. Which of the following is an oxide having covalent bonds?
- (1) MgO
 - (2) Na_2O
 - (3) CaO
 - (4) SiO_2
15. Which of the following equipment must be used to measure correctly 26.0 cm^3 of a sodium chloride solution?
- (1) Measuring cylinder
 - (2) Pipette
 - (3) Burette
 - (4) Volumetric flask
16. Consider the statements ①, ② and ③ related to the situations P and Q shown in the following figures.



- ① - The volume of gas A in situation Q increased due to increase in the temperature.
- ② - The pressure inside the balloon in situation P is greater than that of situation Q.
- ③ - The gas A obeys Charles' law in situations P and Q.

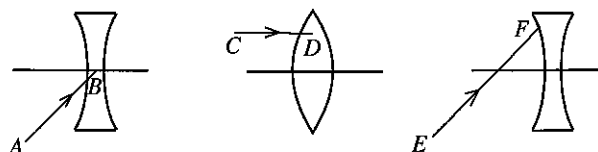
Of the above statements,

- (1) ① and ② are true.
 - (2) ② and ③ are true.
 - (3) ① and ③ are true.
 - (4) all ①, ② and ③ are false.
17. In the production process of rubber, the anticoagulant used to kill bacteria in latex is
- (1) sodium sulphite.
 - (2) ammonia solution.
 - (3) formaldehyde (formalin).
 - (4) sodium carbonate

18. Which of the following metals reacts vigorously with cold water?
 (1) Na (2) Cu (3) Mg (4) Pb
19. Select the option which gives two metals that are extracted by reduction method?
 (1) Na and Cu (2) Cu and Pb (3) Na and Pb (4) Mg and Cu
20. Which of the following is an example for a sedimentary rock?
 (1) Gneiss (2) Granite (3) Marble (4) Mud stone
21. Which of the following gives the number of water molecules in 36 g of water? (H = 1, O = 16)
 (1) $\frac{1}{2} \times 6.022 \times 10^{23}$ (2) 6.022×10^{23} (3) $2 \times 6.022 \times 10^{23}$ (4) $36 \times 6.022 \times 10^{23}$
22. It was necessary to use Halon fire extinguisher to extinguish the fire that has broken out in a building. Accordingly, which of the following could have been the cause for the fire?
 (1) Oil (2) Plastics (3) Electric equipment (4) Timber
23. An electrolytic cell must be designed to electroplate copper on an iron key. The anode, cathode and electrolyte which should be used in this cell are, respectively,
 (1) key, a copper strip and a copper sulphate solution.
 (2) a copper strip, key and diluted sulphuric acid.
 (3) a copper strip, key and a copper sulphate solution.
 (4) key, a copper strip and diluted sulphuric acid.
24. Which of the following is a neutralization reaction?
 (1) $\text{Mg} + 2\text{HCl} \longrightarrow \text{MgCl}_2 + \text{H}_2$ (2) $\text{CaO} + \text{H}_2\text{O} \longrightarrow \text{Ca(OH)}_2$
 (3) $\text{Mg(OH)}_2 + 2\text{HCl} \longrightarrow \text{MgCl}_2 + 2\text{H}_2\text{O}$ (4) $2\text{Na} + 2\text{H}_2\text{O} \longrightarrow 2\text{NaOH} + \text{H}_2$
25. Select the option which gives a vector quantity and a scalar quantity respectively.
 (1) momentum, force (2) momentum, time (3) distance, time (4) velocity, acceleration
26. The temperature of an object is 300 K. This temperature in Celsius is
 (1) 27. (2) 30. (3) 273. (4) 573.
27. The symbol given below represents,
 (1) an optical diode. (2) a Zener diode.
 (3) a NOT gate. (4) an OR gate.



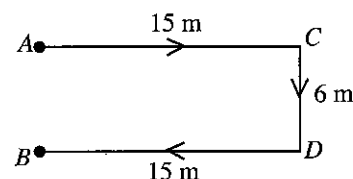
28. Which of the following is **not** a characteristic of electromagnetic waves?
 (1) Can propagate in vacuum (2) Having a charge
 (3) Being transverse waves (4) Obey laws of reflection
29. Consider the light rays AB , CD and EF incident on the lenses given in the following figures.



Select the option which gives the light ray/rays which does/do **not** undergo refraction.

- (1) AB (2) CD (3) AB and EF (4) CD and EF

30. A child moved from the position A on one side of a road to the position B of the opposite side along the path given in the figure. CD shows the region of yellow lines. The displacement of the child in the motion from A to B is



- (1) 6 m.
 (2) 15 m.
 (3) 30 m.
 (4) 36 m.

31. The heat required to increase the temperature of 1 kg of water by 1°C is 4200 J. What is the heat required to increase the temperature of 10 kg of water by 50°C ?

- (1) 21000 J (2) 42000 J (3) 210000 J (4) 2100000 J

32. Consider the following optical instruments.

- A - Simple microscope
- B - Compound microscope
- C - Astronomical telescope

The instruments which consist of two convex lenses are

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

33. The mass of an object is 2 kg. When it moves at the velocity of 4 m s^{-1} its momentum is

- (1) 2 kg ms^{-1} (2) 6 kg ms^{-1} (3) 8 kg ms^{-1} (4) 16 kg ms^{-1}

34. Consider the facts given below regarding a capacitor.

- A - Area of the plates of the capacitor
- B - Distance between the plates of the capacitor
- C - The nature of the dielectric substance in between the plates of the capacitor

Of the above facts, the facts that affect the capacity of the capacitor are

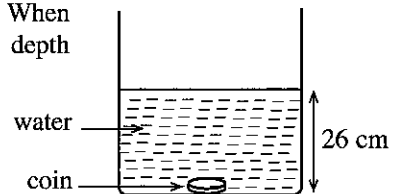
- (1) only A and B. (2) only B and C. (3) only A and C. (4) all A, B and C.

35. In which of the following instances can a p-type semi conductor be made?

- (1) Doping a small amount of phosphorus with germanium
- (2) Doping a small amount of arsenic with silicon
- (3) Doping a small amount of aluminium with germanium
- (4) Doping a small amount of silicon with germanium

36. A coin is kept at the bottom of a water basin as shown in the figure. When the coin is viewed from above the water surface, what is the apparent depth of the coin? (The refractive index of water is 1.3)

- (1) 2.0 cm (2) 2.6 cm
(3) 13.0 cm (4) 20.0 cm



37. What is the gas that rapidly increased in the atmosphere in the year 2016, due to human activities and elnino phenomenon?

- (1) N_2 (2) CO_2 (3) NH_3 (4) SO_2

38. What is the theme of the World Science Day in the year 2017?

- (1) Science for global understanding
- (2) Science for sustainable development
- (3) Science for peace and development
- (4) Science for technology and researches

39. Which of the following items have been completely prohibited from producing, using and selling in Sri Lanka from 01st September 2017?

- (1) Plastic bottles (2) Polystyrene boxes (3) Rubber lids (4) Metal lids

40. Consider the following activities regarding waste management.

- A - Food scraps are used for the consumption of farm animals.
- B - Recycling the items such as polythene and plastic.
- C - The broken instruments consisting heavy metals are deposited in the ground.

Of the above activities, the environment friendly activities are

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

* * *

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 கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2017 டிசெம்பர்
 General Certificate of Education (Ord. Level) Examination, December 2017

විද්‍යාව II
 விஞ்ஞானம் II
 Science II

පැය තුනයි
 மூன்று மணித்தியாலம்
 Three hours

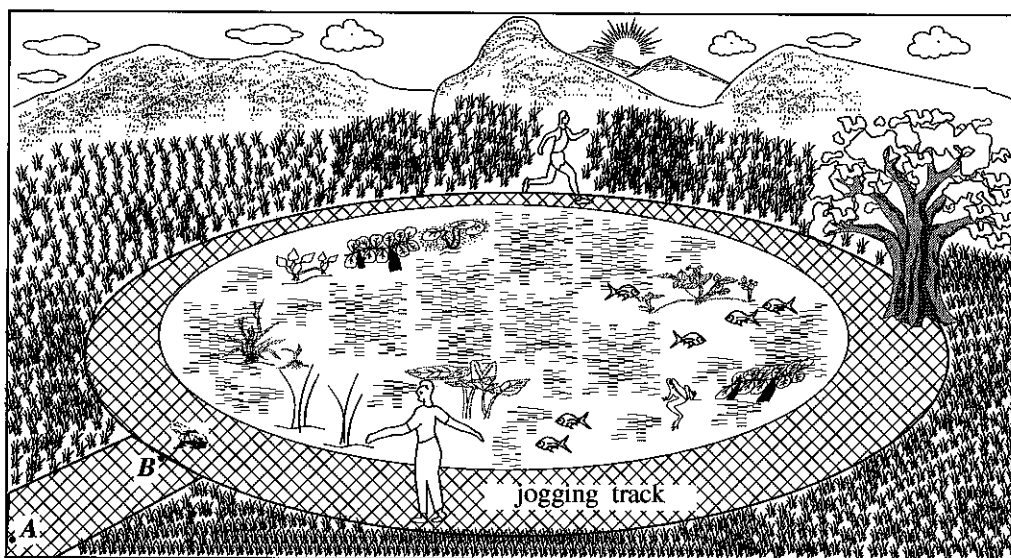
Index Number:

Instructions:

- * Write your answers in neat handwriting.
- * Answer four questions in Part A, in the space provided.
- * Answer three questions in Part B selecting one question each from the sections Biology, Chemistry and Physics.
- * After answering, tie Part A and the answer script of Part B together and hand over.

Part A - Structured Essay Questions

1. The following figure shows a fresh water pond with a jogging track. Grass is grown around the jogging track. (Figure is not drawn to correct scale.)



- (i) Several ecosystems can be seen in the above diagram. Name them.

- (ii) Write down a food chain that can exist in the above environment.

- (iii) Following information were revealed when a sample of water of the fresh water pond was tested.

- CaSO_4 is dissolved in water.
- The BOD value of water is less than 1 ppm.

According to the information above,

- (a) I. what can be said about the hardness of the water in the pond?

- II. which type of ions is responsible for the hardness of water here?

(b) what can be said about the purity of the water in the pond?

.....

(c) what is meant by BOD?

.....

.....

(v) The distance – time graph for the motion of a person in a straight line from A to B in the jogging track is given here. Accordingly,

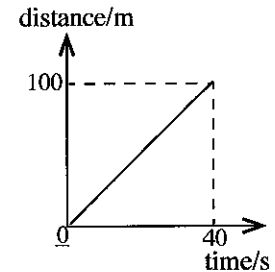
(a) what is the length of AB?

.....

(b) find the speed of the person that walked from A to B.

.....

.....



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2. (A) If each of the following statements is correct, mark (✓) and if it is incorrect mark (X) in the bracket given in front of each of them.

(i) Gametes are formed in the asexual reproduction. (.....)

(ii) Fertilization takes place in the uterus of the female reproductive system. (.....)

(iii) Secondary sexual characteristics of males are caused by testosterone hormone. (.....)

(B) The following figure shows an experimental set-up that is arranged to measure the rate of transpiration of a plant.

(i) Mention the name of this instrument?

.....

(ii) (a) What is the strategy that must be followed when the twig of the plant used for this experiment is cut?

.....

(b) What is the reason for following the strategy stated in (a) above?

.....

(iii) What is the other instrument that is needed to find the rate of transpiration in this experiment?

.....

(iv) Considering the movement of the air bubble from P to Q in the horizontal tube, write down the equation used to calculate the rate of transpiration.

.....

.....

(v) Write **two** factors that affect the rate of transpiration.

.....

.....

(vi) Write down an adaptation in each of the following plants to minimize the transpiration.

Rubber :

Temple tree (*Araliya/Alari*):

Aloe :

15

[See page three]

3. Different type of mixtures can be prepared using different solutes and solvents.

- (i) In the table below the **column I** consists of some solutes and the **column II** consists of some solvents. Match each of the solute in **column I** with a suitable solvent in **column II**, to prepare homogenous mixtures. (One matching is shown)

Column I	Column II
Sodium hydroxide	Ethyl alcohol
Sulphur	Kerosene
Iodine	Water
Grease	Carbon disulphide

(ii) Of the solvents in **column II**,

- (a) name a polar organic solvent
- (b) name a non-polar inorganic solvent

(iii) Write **two** factors which affect the solubility.

.....

.....

(iv) 40 g of sodium hydroxide is dissolved in a 2.0 dm^3 of sodium hydroxide solution. Find the composition of that solution in terms of

- (a) mass/volume (w/v)
- (b) mole/volume (n/v) (Na = 23, O = 16, H = 1)

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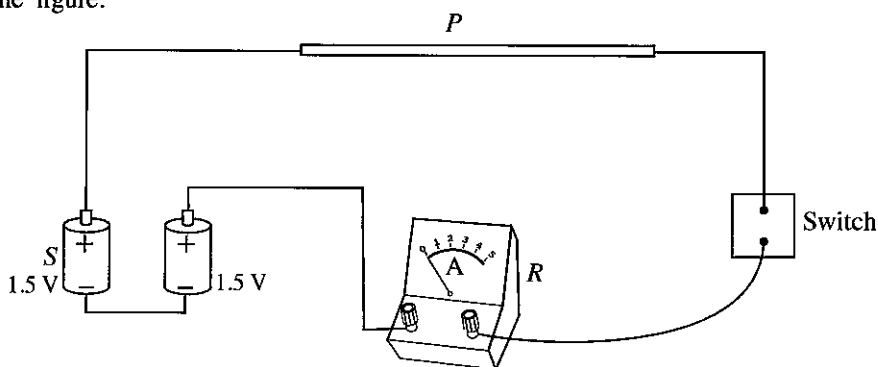
(v) What is the reason for evolving air bubbles when heating water?

.....

.....

15

4. A circuit prepared by a student to find the resistance of a nichrome wire called P of 2 cm long is given in the figure.



(i) Draw the standard circuit symbols relevant to the devices given as R and S .

R : S :

(ii) There is an error in the circuit. State what it is.

.....

(iii) How do you correct the error of the circuit?

.....

[See page four]

- (iv) (a) If the current through the corrected circuit was 1.5 A, find the resistance of the wire *P*.
(Take the data given in the figure for the calculation.)

.....
.....

- (b) Write **two** factors that affect the resistance of a conductor.

.....
.....

- (v) The resistance of a nichrome wire of 6 cm long is 6 Ω . It is necessary to make a resistor with the equivalent resistance of 1.5 Ω by using the wire *P* above and 6 cm nichrome wire, and that resistor must be connected to the circuit.

- (a) Show using a suitable calculation, the way of obtaining the equivalent resistance as 1.5 Ω according to the resistance of these wires.

.....
.....
.....
.....

- (b) How would you connect the two wires to the above circuit to make the equivalent resistance 1.5 Ω ?

.....
.....

* *

Part B - Essay Questions

- Answer **three** questions, selecting **one** question each from the sections **Biology**, **Chemistry** and **Physics**.

Biology

5. (A) Students in a school have decided to establish a medicinal garden in the school premises as a project. The following plants have been selected to be planted there.

Karapincha, Ginger, Jasmine, Centella, Turmeric, Nutmeg

- (i) From among the above plants, write down respectively, a plant that can be propagated by roots and a plant that can be propagated by runners.
- (ii) (a) Write down **two** plants, from among the above plants, which can be propagated by underground stems.
 (b) To which type of underground stems the plants you have mentioned in (a) above belong?
 (c) From the growth of which parts of the underground stem, the new plants are generated?
- (iii) (a) Name a plant from the above plants, that can be propagated by the artificial vegetative propagation.
 (b) Name the artificial vegetative propagation method that can be used for that plant.
 (c) Write an advantage of propagation of that plant by the artificial vegetative propagation method.
- (iv) Students decided to write the scientific name of each plant according to binomial nomenclature and exhibit it in front of the plants to be planted in the garden. The scientific name of one plant is written as follows.

Centella Asiatica

There is an error in the way of writing that name according to binomial nomenclature. Write down that name correctly.

- (B) (i) Three muscle tissues are shown in the figures *P*, *Q* and *R*.



P

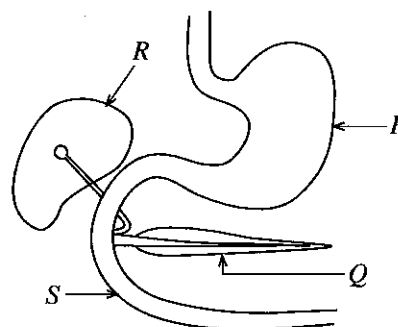


Q



R

- (a) Name the muscle tissues *P*, *Q*, and *R* respectively.
 - (b) Which of the above tissues function involuntarily?
 - (c) Which type of the above tissues is present in walls of blood vessels?
 - (ii) (a) Name the **two** major types of blood cells in blood tissue.
 (b) What is the name given to the fragments of cells present in blood?
 (c) What is the significance of fragments you mentioned in (b) above?
6. (A) Some parts of the human digestive system are given in the following diagram.
- (i) Name the parts *P*, *Q*, *R* and *S*.
 - (ii) Name **two** enzymes released by *Q* and state on which type of food each of those enzymes acts.
 - (iii) (a) Of the parts *P*, *Q*, *R* and *S*, in relation to which part does gastritis occur?
 (b) State a reason for that disease.



[See page six

(B) 'Population' is one of the levels of organization in the biosphere.

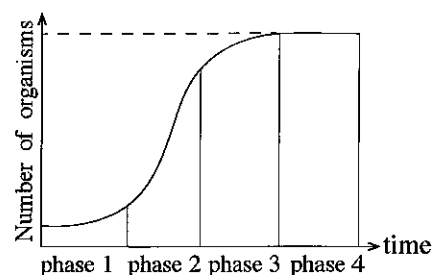
(i) Define 'population'.

(ii) Pattern of growth of a natural population is shown in this graph.

(a) Among the phases shown in the graph, name the phase which shows a rapid growth of organisms and give reasons for that rapid growth.

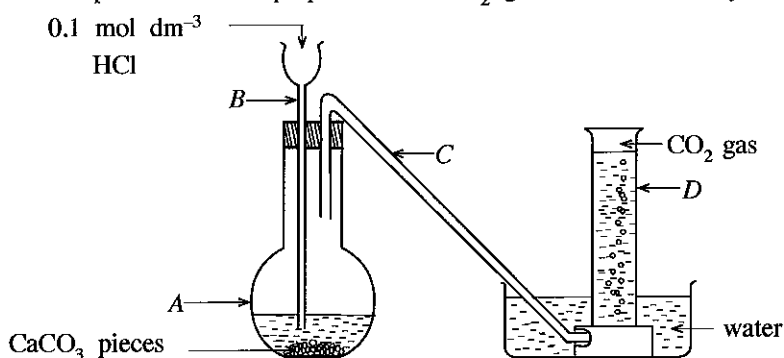
(b) What is known as 'carrying capacity'?

(c) The rate of growth of the human population is higher in developing countries than in developed countries. Write down **three** problems that arise due to this.



Chemistry

7. An experimental set-up used for the preparation of CO_2 gas in the laboratory is given below.



(i) Name the equipment A, B, C and D in the set up above.

(ii) Write the balanced chemical equation for the reaction takes place in A.

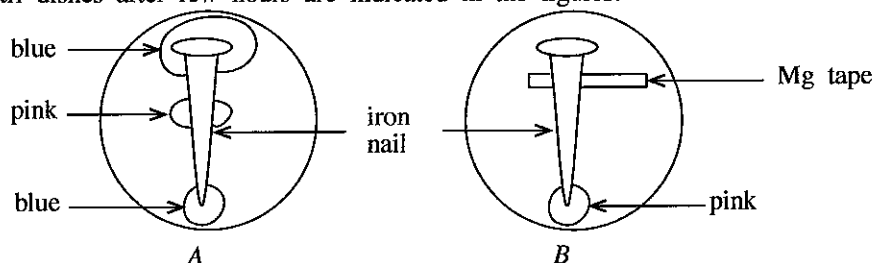
(iii) By increasing the rate of above reaction, CO_2 gas can be produced quickly. How is the rate of reaction increased in this experiment?

(iv) (a) Write the observations, when wet red and blue litmus papers are dipped in D after collecting CO_2 .
(b) Give the reason for your observations in (a) above.

(v) (a) If you use Zn powder instead of CaCO_3 pieces in this experiment, what gas will evolve?
(b) Write **two** differences in physical properties between CO_2 gas and the gas mentioned in (a) above.

(vi) 15 ml of 0.1 mol dm^{-3} HCl solution is used in this experiment. Calculate the number of moles of HCl used in this experiment. (H = 1, Cl = 35.5)

8. (A) An experimental set-up used to find the effect of magnesium metal on corrosion of iron is given by the following figures A and B. The agar medium used in this experiment contains small amounts of sodium chloride, potassium ferricyanide and phenolphthalein. The colour patches obtained in agar medium in the petri dishes after few hours are indicated in the figures.



(i) (a) Write respectively, the ions that are responsible for blue and pink colour formation in the above experiment.

(b) What is the indicator used in this experiment?

(c) What is the substance used to induce the corrosion of iron?

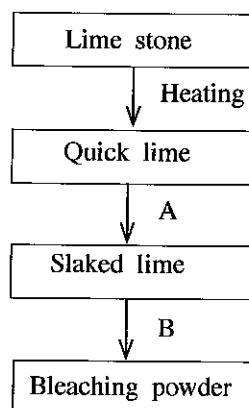
(ii) Iron nail in which Petri dish is subjected to corrosion?

(iii) (a) According to the observations above, what is the place of Mg in the activity series in relation to iron?

(b) How does Mg function in this experiment?

[See page seven]

(B) Consider the following flow chart regarding a Lime stone based process.



- (i) Name A and B.
- (ii) Write the chemical name of quick lime.
- (iii) Write **two** uses of bleaching powder.
- (iv) (a) Write the balanced chemical equation for the reaction that takes place in the production of quick lime from lime stone.
- (b) Find the mass of quick lime that could be produced using 2 kg of pure lime stone. (Ca = 40, O = 16, C = 12)
- (c) Explain with **two** facts, how environmental pollution takes place in the process of quick lime production.

Physics

9. A rough diagram relevant to an instance where water is pulled from a well using a rope is given here. (Take $g = 10 \text{ m s}^{-2}$ for the calculations.)

- (i) If the mass of the bucket completely filled with water is 5 kg, find its weight.
- (ii) What is the weight that is felt by the hand when the bucket is lifted in the instance (i) above?
- (iii) (a) Does the weight felt by the hand when the water bucket is fully immersed in water equal to the weight that you stated in (ii) above?
- (b) What is the reason for your answer in (a) above?
- (c) With a diagram, show the forces acting on the bucket, when it is completely immersed in water.

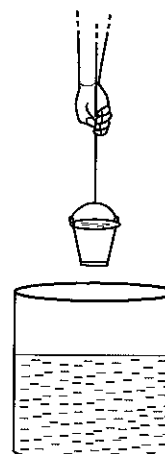


figure (1)

(iv) The height to the water level of the well from the ground level is 8 m. A simple machine named as A is used as in the figure (2) to avoid the difficulty of pulling the bucket as in figure (1) above.

- (a) What is the simple machine A?
- (b) Write an expression for the mechanical advantage of the simple machine used here?
- (c) When the bucket is completely filled with water, the mechanical advantage of the simple machine of pulling the bucket at the instance given in figure is 0.9. Calculate the effort that must be applied here.
- (d) A heavier effort than load must be applied when pulling the bucket. What is the reason for that?
- (e) What is the velocity ratio of this simple machine?
- (f) What is the efficiency of the simple machine.
- (g) If the height from water level of the well to A is 10 m, find the potential energy of the bucket at the level of A. (Take the potential energy as zero at the ground level.)

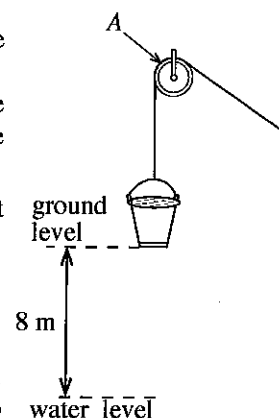


figure (2)

[See page eight]

10. (A) Some instruments which are practised by a music group are given below.

Drum, Violin, Flute, Harmonium

- (i) Of the above instruments, name respectively, an instrument with vibrating air columns and an instrument with vibrating membranes.
- (ii) Write **two** actions that can be followed to get a sharp sound when practising the violin.
- (iii) If the same note is played by the violin and the flute, the two instruments can be identified separately. What is the characteristic of sound that causes for this?

(B) It is required to place 1000 kg of nuclear waste at the bottom of the sea.

- (i) It is needed to select a suitable location to place the above waste at the bottom of the sea.
 - (a) What is the special instrument which uses sound waves, needed to find that place?
 - (b) What is the principle used in that instrument?
 - (c) Sound waves of frequency 29 200 Hz are emitted by the instrument mentioned in (a) above. What is the special name given to those sound waves?
 - (d) The sound wave emitted by the instrument mentioned in (a) above has taken a time of 20 seconds to return and record after striking the bottom of the sea. If the speed of sound in water is $1\,460\text{ m s}^{-1}$, find the distance (h) to the place where waste is deposited in the bottom of the sea from the surface of the sea.
 - (e) Find the wave length of the sound wave mentioned above.
- (ii) (a) If the density of sea water is d , write an equation for the pressure exerted by water at the place where the nuclear waste is placed, in terms of h , d and g (g is the acceleration due to gravity).
- (b) Considering the value of h in part (d) in (i) above, find the pressure exerted by sea water on the place where the nuclear waste is placed. The density of sea water is $1\,100\text{ kg m}^{-3}$.
(Take $g = 10\text{ m s}^{-2}$)

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