

G.C.E. (O.L.) Support Seminar - 2014

Science I

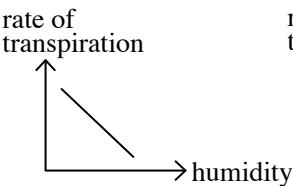
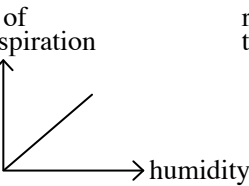
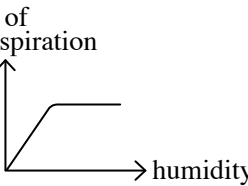
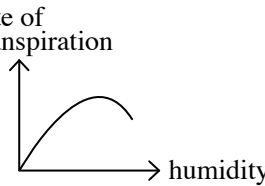
One hour

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.*

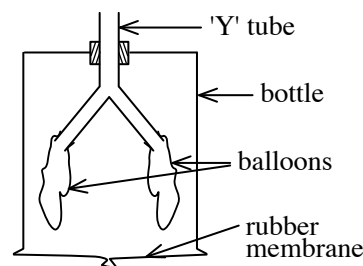
1. Which of the following plants produces seeds dispersed by wind?
 (1) love grass (*thuththiri*) (2) drumstick (*murunga*) (3) olinda / *kuntri mani* (4) rubber
2. Given below are four steps followed by a student to examine an epidermal peel of a betel leaf.
 A - putting the peels of the betel leaf into water
 B - examining under the low power of the microscope
 C - placing a small piece of the peel on a glass slide with a brush
 D - covering the membrane with a cover glass without letting in air bubbles
 What is the correct order of the above steps?
 (1) A, B, C, D (2) A, C, D, B (3) C, A, D, B (4) B, D, A, C

3. After sometime, bleeding caused by an injury stopped. Which component provided by the blood plateletlets is responsible for this?
 (1) thrombin (2) prothrombin (3) fibrinogen (4) thromboplastin

4. What is the graph that indicates how the humidity in air affects the rate of transpiration?
 rate of transpiration
 (1)  (2)  (3)  (4) 
 (1) (2) (3) (4)

5. Which is the correct statement relevant to the action of the human kidney?
 (1) It performs all the excretory functions.
 (2) It maintains all the components in the blood in equilibrium.
 (3) It helps maintain water balance in the body.
 (4) Weakening of kidneys causes diabetes.

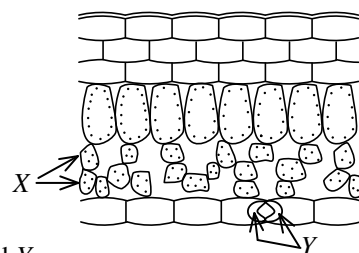
6. The diagram shows an apparants set up to demonstrate the action of respiration. Which of the following cannot be demonstrated by this?
 (1) action of the diaphragm
 (2) action of intercostal muscles.
 (3) action of lungs during inspiration.
 (4) action of lungs during expiration.



7. Listening to a song and dancing are two coordinations brought about by the brain. The two parts of the brain important to effect the above two respectively are
 (1) cerebrum and cerebellum (2) cerebellum and cerebrum
 (3) cerebrum and medulla oblongata (4) cerebellum and medulla oblongata

The diagram below shows a cross section of a plant leaf. Answer the questions 8 - 9 based on it.

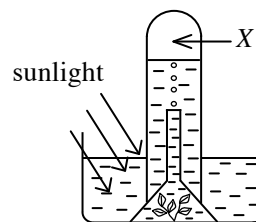
8. The cells labelled X and Y respectively are
 (1) spongy parenchymatous cells and epidermal cells.
 (2) spongy parenchymatous cells and guard cells.
 (3) palisade parenchymatous cells and guard cells.
 (4) palisade parenchymatous cells and epidermal cells.



9. The biological processes brought about by the action of the structure labelled Y are,
 (1) transport and photosynthesis (2) transport and guttation
 (3) guttation and transpiration (4) photosynthesis and respiration

10. An advantage of the use of molecular biotechnology is,
 (1) the production of alcohol using micro-organisms.
 (2) the production of human insulin hormone.
 (3) the use of micro-organisms for the decomposition of garbage.
 (4) the production penicillin to control pathogenic micro-organisms.

11. The diagram illustrates how a green aquatic plant was exposed to sunlight for a few hours. The gas/gases collected most at the space marked X in the upper part of the test tube is/are,

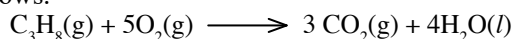


- (1) oxygen (2) carbon dioxide
 (3) oxygen and carbon dioxide (4) oxygen and nitrogen

12. Which of the following responses indicates the correct examples for the corresponding underground stem?

Underground stem	Examples
(1) rhizome	ginger, Alocacia (gahala)
(2) come	Colocasia (habarala), buthsarana
(3) bulb	onion, leeks
(4) stem tuber	potatoes, turmeric

13. The chemical reaction taking place when one mole of propane (C_3H_8) undergoes complete combustion is as follows.



The quantity of heat evolved during this reaction was 340 kJ. What amount of heat in kilojoules (kJ) will be evolved when 4.4 g of propane undergoes complete combustion?

- (1) $\frac{340 \times 4.4}{44}$ (2) $\frac{340 \times 44}{4.4}$ (3) $\frac{44 \times 4.4}{340}$ (4) $4.4 \times 44 \times 340$

14. Given below is a note copied by a student from a leaflet giving information about the types of fires and the fire extinguishers suited for them. What is the line copied by the student incorrectly?

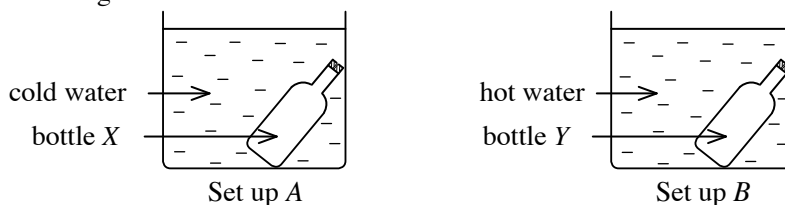
Type of the fire	Type of the fire extinguisher			
	water fire extinguisher	foam fire extinguisher	carbon dioxide fire extinguisher	powder fire extinguisher
(1) paper	✓	×	✓	×
(2) diesel	×	✓	✓	✓
(3) bio-gas	×	×	✓	✓
(4) electricity	×	×	✓	✓

15. In which of the following instances a single displacement reaction will occur?

- (1) heating a piece of Mg in the air (2) adding a piece of Cu to a $AgNO_3$ solution
 (3) adding NaCl to a silver nitrate solution (4) thermal decomposition of $CaCO_3$

- Questions 16 and 17 are based on the following activity.

Two identical small bottles (X and Y) each closed with a stopper with a very small aperture are placed in two vessels containing cold water and hot water.



16. What is the observation at the beginning of the above activity?

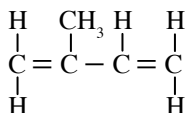
- (1) Gas bubbles evolve from X and Y. (2) Gas bubbles evolve only from X.
 (3) No gas bubbles are evolved from both X and Y. (4) Gas bubbles evolve only from Y.

17. Which of the following is correct about the masses of the gas in the bottles X and Y after the set ups A and B cool to the room temperature?

- (1) X and Y contain equal masses of gases.
 (2) The mass of gas in Y is greater than that in X.
 (3) The mass of gas in X is greater than that in Y.
 (4) The masses of gas in both X and Y are greater than those at the beginning.

18. How many magnesium atoms are present in 6 g of magnesium? ($M_g = 24$)
 (1) 1.505×10^{23} (2) 3.011×10^{23} (3) 6.022×10^{23} (4) 2.4088×10^{24}
19. The molecular formula of urea is $\text{CO}(\text{NH}_2)_2$. What is the percentage of nitrogen (N) in urea?
 ($H = 1, C = 12, O = 16, N = 14$)
 (1) $\frac{14}{58} \times 100$ (2) $\frac{14}{60} \times 100$ (3) $\frac{28}{60} \times 100$ (4) $\frac{60}{28} \times 100$
20. The initial volume of a certain gas is V and its initial pressure is P . What will be the new pressure of this gas when its volume becomes V_1 at constant temperature?
 (1) $\frac{PV_1}{V}$ (2) $\frac{PV}{V_1}$ (3) $\frac{VV_1}{P}$ (4) $\frac{V}{PV_1}$

21. The chemical structure of the isoprene molecule is as follows.

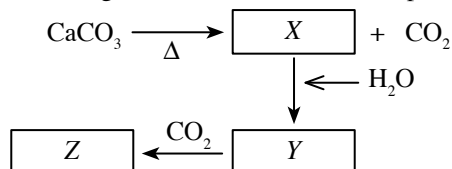


Some statements about the above molecule are given below.

- A - This is an organic compound.
 B - This molecule is the building unit of natural rubber.
 C - This molecule has covalent bonds only.

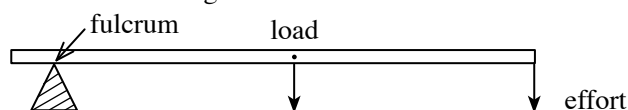
Which of the above are true?

- (1) A and B (2) A and C (3) B and C (4) All A, B and C
22. A practical use of bleaching powder is
 (1) using as a germicide (2) production of cement
 (3) production of calcium carbide (4) absorption of carbon dioxide gas
23. When choosing a site for a chemical industry, a fact that should be given more consideration is the availability of
 (1) capital. (2) trained labourers.
 (3) a suitable market. (4) facilities to dispose waste.
24. The following chart illustrates the decomposition of limestone and the reactions relating to some of its products.



In this, the compounds X, Y and Z respectively are,

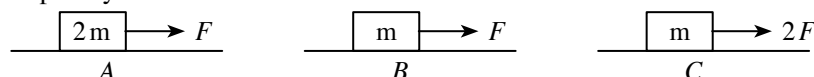
- (1) CaO, CaCO_3 and $\text{Ca}(\text{OH})_2$ (2) $\text{Ca}(\text{OH})_2$, CaO and CaCO_3
 (3) CaO, $\text{Ca}(\text{OH})_2$ and CaCO_3 (4) $\text{Ca}(\text{OH})_2$, CaCO_3 and CaO
25. Consider the following lever.



An example for this class of levers and its velocity ratio respectively are

	Example	Velocity ratio
(1)	wheelbarrow	less than 1
(2)	see-saw	equal to 1
(3)	fishing rod	less than 1
(4)	nut cracker	greater than 1

26. Following figures illustrate three situations where three objects A, B and C are placed on the same surface and acted upon by the forces shown.



The instances where the above objects show maximum and minimum acceleration respectively are

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

27. Some statements about the transmission of heat are given below.
- A - Conduction of heat is the transmission of heat in a particular direction through particles without a movement of the particles from place to place.
 - B - Convection of heat is the transmission of heat with the movement of particles.
 - C - Radiation of heat is the transmission of heat from place to place with the involvement of particles in a medium.

Which of the above statements are correct?

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

28. Which of the following statements is true about the electromagnetic waves.
- (1) The velocity of electromagnetic waves varies according to the type of the wave.
 - (2) Electromagnetic waves are generated only by natural processes.
 - (3) Electromagnetic waves have an electric charge.
 - (4) Electromagnetic waves transmit energy from one place to another.

29. Consider the following statements regarding the electromagnetic induction.
- A - A transformer functions on the principle of electromagnetic induction.
 - B - A current is induced only when the magnetic field moves inside a coil.
 - C - The principle of electromagnetic induction is used during the production of hydroelectricity.

Which of the above statements are true?

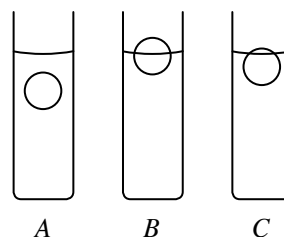
- (1) A and B only (2) A and C only (3) B and C only (4) All A, B and C

30. Which of the following is not a precaution taken to minimize the problems due to electrostatic charges?
- (1) Covering the floors of operation theatres with antistatic materials.
 - (2) Fixing metal strips in the tubes used to fill fuel to automobiles.
 - (3) Fixing lightning conductors at the highest point of buildings and earthing.
 - (4) Connecting the earth wires in houses to another pipe that is driven into soil.

31. The head lamp of automobiles has a concave reflecting surface. In order to direct light to a greater distance the bulb should be placed
- (1) between p and f of the concave surface. (2) on f of the concave surface.
 - (3) between f and c of the concave surface. (4) on c of the concave surface.

• Questions 32 - 34 are based on the activity described below.

32. The figure shows how three identical spheres made of the same material stay when they were put into three solutions of different densities. Which of the following can be said about the masses of the liquids displaced in A, B and C?



- (1) Mass of the volume of the fluid displaced in A is greater than that in B and C.
- (2) Mass of the volume of the fluid displaced in B is greater than that in A and C.
- (3) Mass of the volume of the fluid displaced in C is greater than that in A and B.
- (4) Masses of the volumes of the fluid displaced in all the three instances are equal.

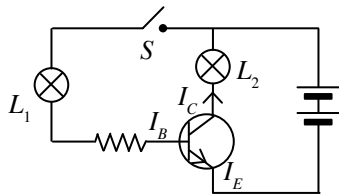
33. The mass of a sphere shown above is 12 g. If the above spheres were connected to spring balances so that the spheres stay at the same positions shown in the figure, which of the following is correct about the readings in the spring balances?

- (1) The reading is 0 in all the three instances.
- (2) The reading is 1.2 N in all the three instances.
- (3) The reading in A is less than those in B and C.
- (4) The reading in A is 1.2 N and the reading in B and C is 0.

34. The descending order of the densities of the above solutions is,

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

35.



Consider the following statements regarding the circuit given in the diagram.

- A - Only L_2 lights when switch S is open.
- B - When switch S is closed, L_1 does not light but L_2 lights.
- C - This belongs to *npn* type transistors.

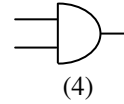
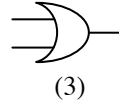
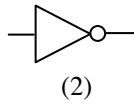
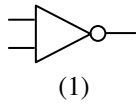
Which of the above statements are true?

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

36. The following table presents the logic given by a logic gate in an electronic circuit.

A	B	Z
1	1	1
1	0	1
0	1	1

What is the symbol of the gate relevant to the above logic?



37. The notice "Put off the engine before starting the filling of fuel" had been displayed in a filling station. Which of the following is the reason to display such a statement?

- (1) Disturbances caused to filling by the vibrations of the vehicle.
- (2) Damages caused to the things around due to resonance created by the vibrations of the engine.
- (3) Recording faulty readings in the meter about the amounts of the fuel siphoned out.
- (4) Danger of breaking out fires by sparks in an environment rich in petrol vapour.

38. Given below are some of the measures proposed to prevent the entry of viruses such as Ebola to Sri Lanka.

- A - Limiting the tours in countries under the threat
- B - Subjecting the tourists to strict examination when they enter our country
- C - Instructing all Sri Lankan citizens to wear masks

Of the above, the more practical measures are

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

39. Recently, Sri Lanka has inclined to use coal to produce thermal electric power. What can be the reason for this?

- (1) lack of environmental pollution (2) coal being a natural resource of our country
- (3) coal being economically more profitable (4) coal being a renewable source of energy

40. A space centre cannot be considered an eco-system. Given below are three reasons given for this.

- A - lack of circulation of substances
- B - absence of an established bio-community
- C - absence of interactions between the environment and living organisms

Which of the above statements are true?

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

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Science II

Three hours

Instructions :

- (i) Answer **four** questions in Part A, in the space provided.
- (ii) Answer **three** questions in Part B, selecting **one** question each from the sections Biology, Chemistry and Physics.

Part A - Structured Essay

1. The diagram roughly illustrates an arrangement made to get water into a pond in a home garden from a stream near a house.

(i) (a) What is the advantage of using a sluice gate in this setting?
.....

(b) To which class of simple machines does the device used to move the sluice gate up and down belong?
.....

(ii) (a) In this, water is filtered by a mesh. To what method of treatment of water does this belong?
.....

(b) What is the problem that would arise if the mesh is made up of steel wire?
.....

(iii) After a few days, the water in the pond turned green and gave a foul smell.

(a) What can this condition be called?
.....

(b) Name a type of ion which water may contain to bring about this condition.
.....

(c) Is the BOD value of this water less than or greater than or equal to 1?
.....

(iv) State a method adopted to prevent the breeding of mosquitoes in this pond.
.....

(v) Opposite each of the following statements about the pond, place a tick (✓) if it is correct and a cross (×) if it is wrong.

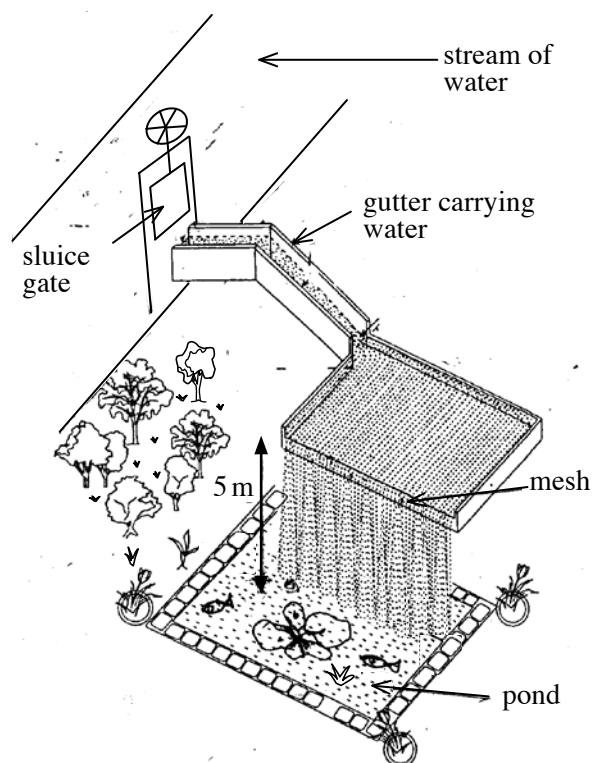
(a) The water level decreases due to evaporation of water. (.....)

(b) The salinity of water decreases because of accumulation of water over a long period of time. (.....)

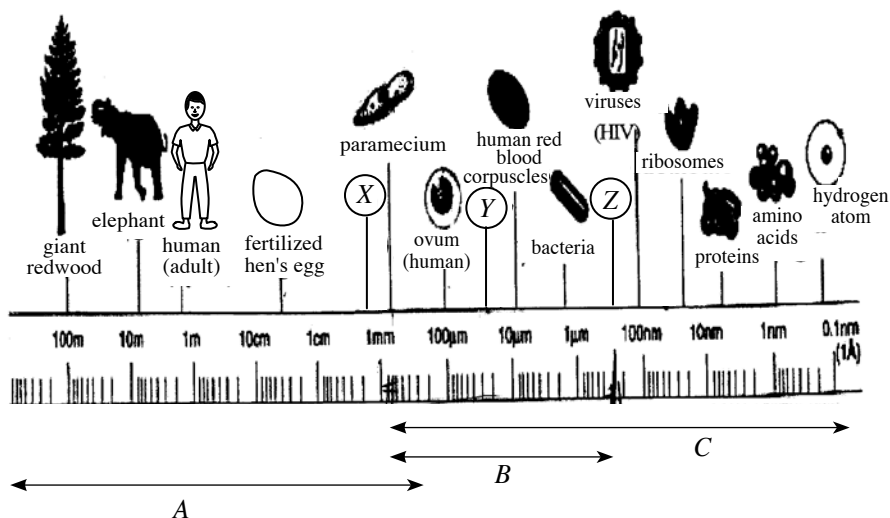
(c) This pond can be called an eco-system. (.....)

(vi) (a) The mesh is placed 5 m above the pond. Water of mass 8 kg falls on the mesh in one second. Find the amount of potential energy stored in this mass of water. ($g = 10 \text{ m s}^{-2}$)
.....

(b) If there is no loss of energy, find the velocity with which water falls on the mesh.
.....



2. (A) Given below is a way of classifying various substances and objects. The ranges marked A, B and C are those that can be seen by the naked eye, under the optical microscope and under the electron microscope respectively. Using this diagram answer the following questions (The diagram is not drawn to scale).



- (i) Select from the above diagram the living organism/substance fitting into the following.
- (a) a protozoan
 - (b) a warm blooded organism
 - (c) a haploid cell
 - (d) an end product of digestion
 - (e) a cell important for transport

(ii) State a characteristic of the living organism that can be seen only by the electron microscope.

(iii) Name a disease caused by the virus given here.

- (iv) Select from the following the organism/substance fitting into the places X, Y and Z. (white blood corpuscle, mitochondrion, chlamydomonas, ova of the shoe flower)
- X -
 - Y -
 - Z -

(B) Ear is the structure that receives the sense of hearing. It consists of three parts middle ear, outer ear and inner ear.

- (i) (a) Except hearing, name another function performed by the human ear.

- (b) What structure in the ear is responsible for this function?

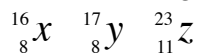
- (ii) State a function performed by each of the following structures in the ear.
- (a) pinna
 - (b) eustachian tube
 - (c) auditory nerve

3. (A) (i) There are three sub-atomic particles in an atom. They are electrons, protons and neutrons. Write the name of the sub-atomic particle that matches the following statements.

(a) a negatively charged particle

(b) a particle without a charge

(ii) Numerical values relating to three atoms x , y and z are as follows.



(a) According to the above values what are the isotopes?

.....

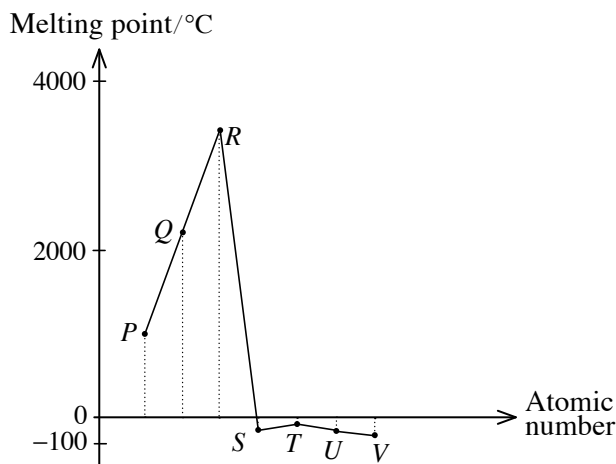
(b) What is the property that enables the identification of those atoms as isotopes?

.....

(c) Write the formula of the compound formed by the reaction between y and z .

.....

(B) The graph shows the variation of melting points of seven consecutive elements belonging to the second period of the periodic table against the atomic number. The symbols given are not true symbols. Element R exists in two major allotropic forms.



(i) (a) Identify the group of element R .

.....

(b) State the names of the two allotropic forms of R .

1.

2.

(c) Indicate the reason why both these allotropic forms have high melting points.

.....

.....

(d) Draw the dot and cross structure of the compound formed between R and U (Only the electrons in the outermost shells need to be shown).

(ii) Of the above elements given, select the letter relevant to each of the following.

(a) The metallic element

(b) The most unreactive element

(c) The element used to make semi-conductors


(iii) Write the formula of the compound formed by the reaction between P and T .

.....

4. (A) The diagram illustrates a part of a circuit supplying electricity to a house.

(i) Name the part labelled *x*.

.....

(ii) A device is represented as .

(a) What is the name of this device?

.....

(b) What is its function?

.....

(iii) Inside the circles write *L* to indicate the live wire and *N* to indicate the neutral wire.

(iv) The three bulbs *A*, *B*, *C* are labelled 40 W, 60 W and 75 W respectively. Write a physical quantity related to electricity that is equally supplied and differently supplied to these three bulbs.

(a) equally supplied

(b) differently supplied

(v) What type of a switch has been used for the bulb *C*?

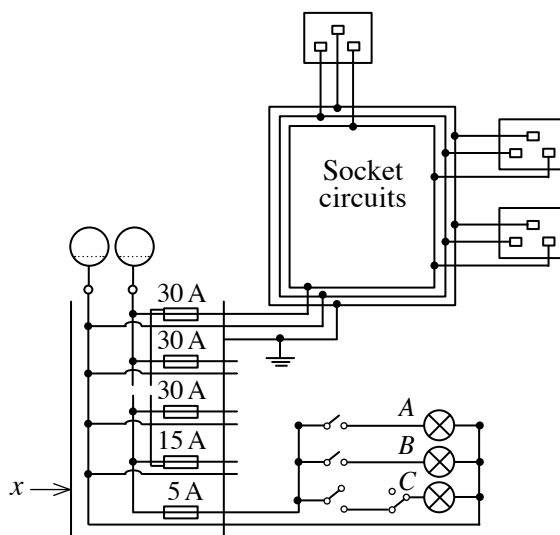
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(vi) The earth wire of the circuit is earthed. What is the advantage of this earthing?

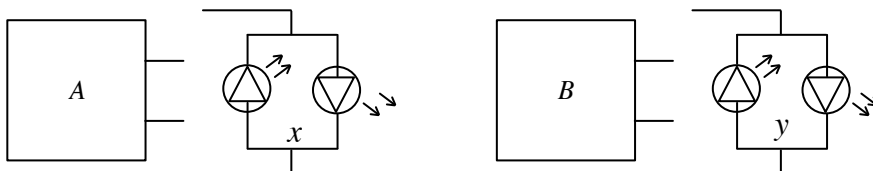
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(vii) State an advantage of converting a socket circuit to a loop circuit.

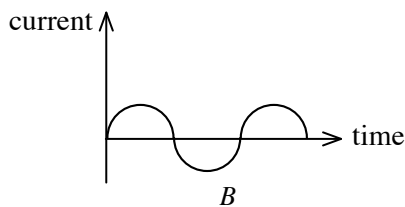
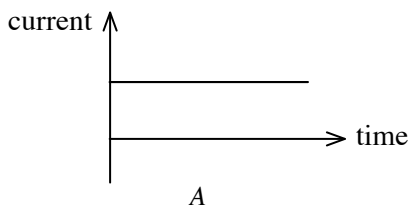
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(B) *A* and *B* in the following diagrams are two devices that help produce electricity.



The variation of the current in *A* and *B* with time was as follows.



(i) What are the components in *A* and *B* that produce electricity?

A *B*

(ii) What are the currents produced in *A* and *B* called?

A *B*

(iii) If the circuit parts *x* and *y* are connected to *A* and *B*, state the possible observations about the lighting of LEDs in them.

A *B*

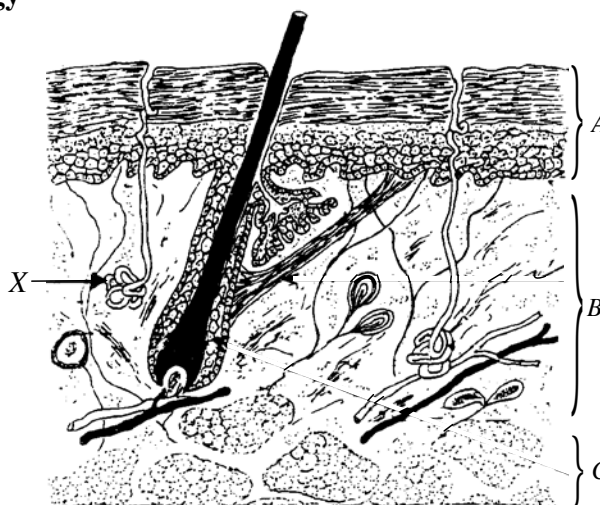
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Part B - Essay

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

Biology

5. (A) The diagram shows a cross section of the skin. Skin contains living cells as well as non-living cells.



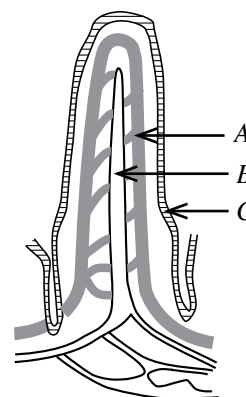
- Of A, B and C, in which layer are the non-living cells of the skin occur?
- Name one of the features seen in the diagram to confirm that this is a mammalian skin.
- 'X' is a sweat gland. It secretes sweat which is an excretory product.
 - What substance is present most in sweat?
 - As what glands, the sweat glands be classified; endocrine glands or exocrine glands?
- State **two** major functions carried out by the skin.
- When an injury is caused during day time on a hot day, more bleeding occurs. Explain the reason for this.

(B) Digestive system is the system adapted to digest food and absorb digestive products. In the mouth, food is subject to both chemical digestion and physical digestion.

- State one modification of mouth to effect physical digestion of food.
- What nutrients in the food is subjected to chemical digestion in the mouth?
- Food is retained for about three hours in the stomach. The chyme subsequently formed is released into the duodenum.
 - The food containing proteins is converted to polypeptides in the stomach. What is the enzyme that brings about this change?
 - What is the structure that controls the release of chyme into the duodenum.
- Bile, a substance important for digestion of food is produced by the liver.
 - People with weak livers are advised to control fatty food. What is the reason for this?
 - Three blood vessels are connected to the liver. One of them is the hepatic artery. Name the other two blood vessels.

(v) The diagram roughly illustrates the structure of a villus.

- Name the parts A and B.
- To what system is the vessel B connected?
- Name an end product of digestion that enters the vessel B.
- Name the type of tissue shown by C.



6. (A) Energy is essential for the perpetuation of an ecosystem. Sun is the major source that provides energy to all the ecosystems on the Earth.
- What is the main process carried out by green plants utilizing solar energy?
 - If green plants in an ecosystem fixed 10000 J of energy, what is the amount of energy passed onto the organisms in the trophic level III through the food chains?
 - Draw the energy pyramid that shows the flow of energy along the three trophic levels in an ecosystem as stated in part (ii) above.
 - Name the main products of the saprophytic activity on the complex nitrogenous compounds contained in the dead bodies of plants and animals.
- (B) Plants too respond to stimuli like animals. Given below are three such instances.
- Drooping of Mimosa leaves when touched
 - Bending of the sun flower towards light
 - Growth of a plant root towards gravity
- Name in order, the types of movements relevant to the responses *A*, *B*, *C* given above.
 - Select from *A*, *B* and *C* above, the responses brought about under the influence of growth promoting substances.
 - Explain the role of growth promoting substances in the growth of a plant shoot bending toward light coming from one direction.
 - Write a difference between animal hormones and growth promoting substances in plants.
- (C) Reproduction is an important biological process taking place in living organisms.
- Explain what is meant by reproduction.
 - State one difference that can be seen between the offspring produced by sexual reproduction and asexual reproduction.
 - Name the occasions where meiosis occurs in a mature plant.
 - In *Mirabilis* plants, red flowers are dominant over white flowers. In a cross between a red flower plant and a white flower plant, red flowers were expected according to the Mendelian pattern. But all the flowers were found to be pink in colour.
 - What is the name given to this phenomenon?
 - Taking *R* as the gene responsible for red colour and *r* as the gene responsible for white colour, state separately the phenotype and genotype obtained when a plant with pink flowers is self - pollinated.

Chemistry

7. (A) Given below are two tables showing the solutes and solvents taken by a student for an activity carried out on factors affecting solubility. Assume that *P*, *Q* and *R* are sodium chloride, iodine and calcium carbonate (not respectively). Also assume that *X* is a solid ionic compound and the temperature during the time of the experiment is 29°C. The masses of the solutes dissolved in the activity are given in the tables.

Activity I

Solute	<i>P</i>	<i>Q</i>	<i>R</i>
Maximum mass of the solute dissolved in 100 g of water/g	7.3	5.2	3.1

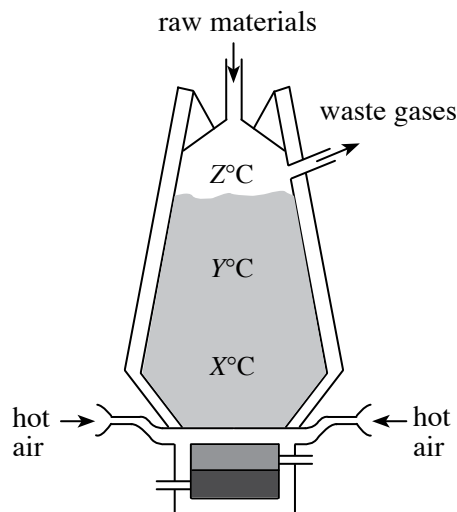
Activity II

Solvent	Hexane	Water	Alcohol
Mass of <i>X</i> dissolved in 200 g of the solvent/g	not soluble	8.5	2.1

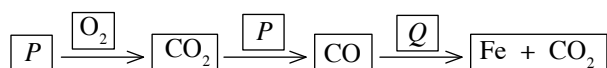
- In order to study the effect of which factors relating to solubility would the activities I and II have been conducted by the student?
- If the solutes used in activity I were sodium chloride, iodine and calcium carbonate, indicate what *P*, *Q* and *R* are.

- (iii) State a measure which could be taken to increase the solubility values during Activity I.
- (iv) Explain the term 'solubility'.
- (v) Using the data given, calculate the solubility of X in water.
- (vi) 250.00 cm^3 of a solution was prepared by adding 5.85 g of sodium chloride into a volumetric flask. ($\text{Na} = 23$, $\text{Cl} = 35.5$)
 - (a) What is the amount of moles of sodium chloride used to prepare the solution?
 - (b) Calculate the concentration of the solution prepared.
 - (c) State stepwise, how 250.00 cm^3 of the solution of the required concentration is prepared.

(B) Iron ore is used as the main raw material in the extraction of iron. Iron ore contains impurities and to remove them, first, the ore is roasted. Then it is fed into a blast furnace. The diagram shows a longitudinal section of such a blast furnace.



- (i)
 - (a) Name an **element** present in the iron ore as an impurity.
 - (b) State an environmental problem caused by the roasting of iron ore in air.
 - (c) Name the raw materials indicated in the diagram.
- (ii) X , Y and Z indicate the temperatures inside the blast furnace during iron extraction. Write those temperatures in the ascending order.
- (iii) Given below is a schematic representation of the process that takes place in the blast furnace.



- (a) Name P and Q above.
- (b) Write the balanced chemical equation for the reaction between Q and CO above.
- (iv) Waste gases are also released during the process of extraction of iron. Among those waste gases is a one that is important for photosynthesis.
 - (a) Name that gas.
 - (b) State another way in which this gas is important for living beings.

8. (A) The activity series is mainly based on the reactivity of metals with air, water and acids. The arrangement of some of the common metals in the activity series is given below.

$\text{K, Na, Ca, Mg, Al, Zn, } \boxed{M}, \text{ Sn, Pb, Cu, Hg, Ag, Pt, Au}$

- (i) Identify metal M .
- (ii) Three experiments proposed by a student to study the displacement of metals in solution by other metals are stated below.
 - A. Adding calcium metal to an aqueous solution of zinc sulphate.
 - B. Adding magnesium metal to an aqueous solution of copper sulphate.
 - C. Adding silver metal to an aqueous solution of copper sulphate.
 - (a) State a reason why A is **not** a suitable method regarding the aim of the experiment.
 - (b) Of B and C , a displacement reaction occurs only in B .
 - 1. Write a balanced chemical equation for this reaction.
 - 2. Give **two** changes which you expect to observe during this reaction.
 - 3. When conducting this experiment, one student added 0.1 mol of magnesium metal to 100 cm^3 of a 1.0 mol dm^{-3} copper sulphate solution while another student added 0.1 mol of magnesium metal to 200 cm^3 of 1.0 mol dm^{-3} copper sulphate solution. Will there be any difference in the amount of the metal displaced? Briefly explain your answer.
 - (c) What is the reason why there was no displacement in C ?
- (iii) State a use of the activity series.

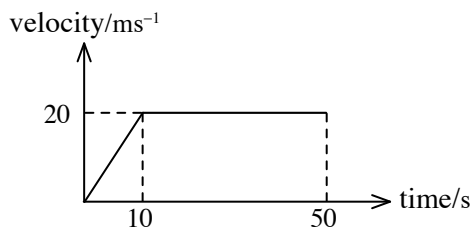
(B) The following table gives three instances of electrolysis using carbon (graphite) and copper as electrodes.

Instance	Substance (Electrolyte)	Anode	Cathode
<i>P</i>	Water acidulated with sulphuric acid.	carbon	carbon
<i>Q</i>	Aqueous solution of copper sulphate.	carbon	carbon
<i>R</i>	Aqueous solution of copper sulphate.	copper	copper

- (i) Evolution of gas bubbles was seen in the instances *P* and *Q*.
 - (a) Name this gas.
 - (b) Give a test to identify this gas.
- (ii) Write the equation for the half - reaction occurring at the cathode in *P*.
- (iii) With the passage of time, will the pH of the solution in *P* decrease or increase or remain same?
- (iv) What change can be observed on the cathode of *Q*?
- (v) Write the reduction half - reaction occurring in *R* and state at which electrode it happens.
- (vi) In which of the above instances, the anode dissolves?
- (vii) With passage of time, will the intensity of blue colour in *R* decrease, increase or remain same?
- (viii) Of *P*, *Q* and *R*, which one is most suitable to obtain pure copper from impure copper?

Physics

9. (A) The following graph illustrates the motion of an object of mass 10 kg started from rest. The path of motion was linear and its surface was uniform.

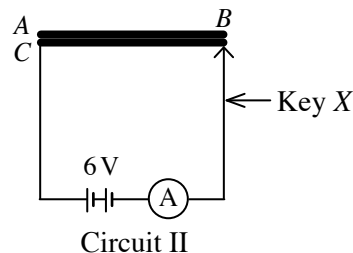
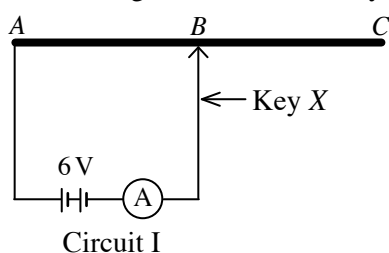


- (i) According to the graph, find the acceleration acquired by the object.
- (ii) (a) What unbalanced force should be applied to that object to acquire the above acceleration.
(b) What is the distance travelled with that unbalanced force?
- (iii) A force of 12 N acted on that object during the period from 10th second to 50th second.
 - (a) What is the frictional force that acted on the object during that period?
 - (b) State how you arrived at the answer.
- (iv) After 50 seconds, a mass of 5 kg was added to the object.
 - (a) What change in motion occurs then?
 - (b) Explain the reason for the change in motion which you stated above.
 - (c) To what law of physics does the reason you gave above conform?

(B) Consider the circuits I and II given below.

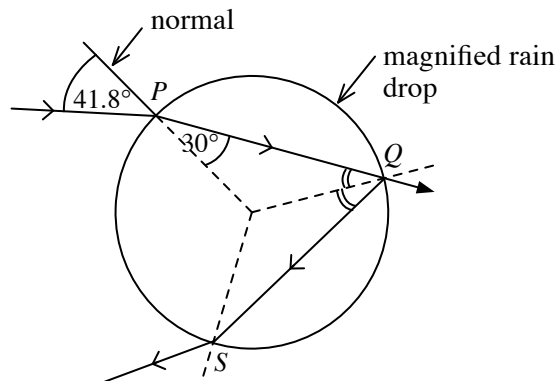
Circuit I - This shows how the key X is brought into contact with point B at the middle of the uniform wire AC .

Circuit II - This show how the points A and C are brought into close contact with each other by bending the wire AC exactly at its middle.



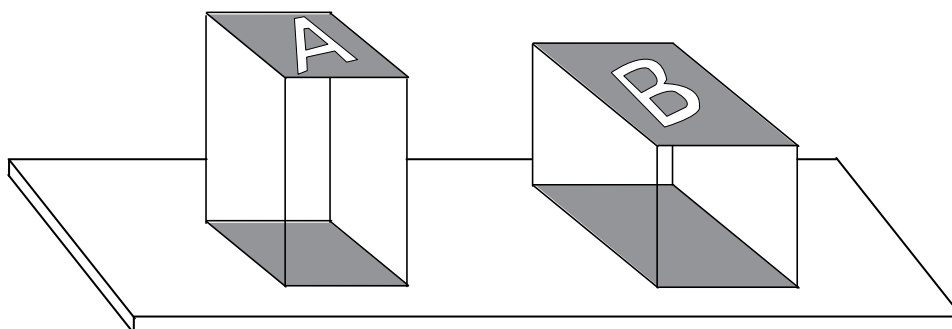
- (i) In circuit I, in two occasions, key X was brought into contact with point B and point C . What can be said about the current flowing in the wire according to ammeter reading in these two occasions?
- (ii) When key X touches point C in circuit I, the ammeter reading was 1.5 A. Find the resistance of the wire.
- (iii) Calculate the resistance of the wire in circuit II.

(C) A monochromatic ray of light enters a spherical rain drop at P . The figure illustrates how this ray emerges at point S after a reflection at Q .



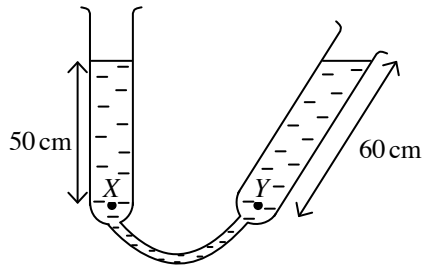
- (i) Name a natural phenomenon resulted by the reflection of light rays as shown in the figure.
- (ii) (a) Find the refractive index of water as per the information presented in the figure.
($\sin 41.8^\circ = 0.6667$, $\sin 30^\circ = 0.5000$)
(b) Write the law which you used to find the refractive index above.

10.(A) The two objects A and B is with a weight of 100N shown in the diagram are different in length, depth and height. The diagram shows how they are placed on a table.



- (i) If the area of A in contact with the table is 1 m^2 and the area of B in contact with table is 2 m^2 which object exerts a greater pressure?
- (ii) Calculate the pressure exerted by object A on the table.
- (iii) As regards the needs of people there are instances where the pressure is decreased and increased in day today life. Give an example each for an instance where the pressure is increased and decreased.

(B) The container shown in the diagram is filled with water.

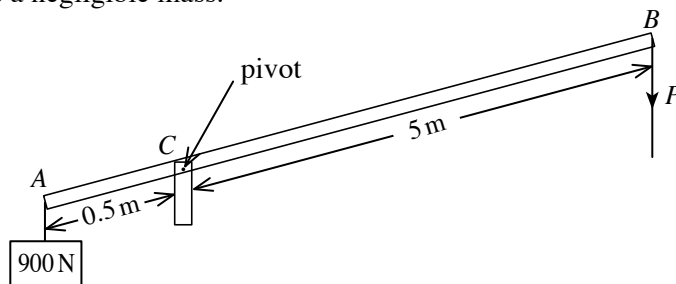


- (i) Find the pressures at the point X and Y in pascals.
(density of water = 1000 kg m^{-3} and $g = 10 \text{ m s}^{-2}$)
- (ii) Explain scientifically the reasons why the bund of water reservoirs are made broader towards the base.

(C) The specific heat capacity of the substances affects the temperature changes in different substances on the supply of heat to them. When equal quantities of heat were supplied to equal masses of two liquids x and y temperature in x changed from 30°C to 50°C whereas the temperature in y changed from 30°C to 80°C .

- (i) Of the liquids x and y , which has the higher specific heat capacity?
- (ii) The specific heat capacity of x is $4200 \text{ J kg}^{-1} \text{ K}^{-1}$. What does this mean?
- (iii) Find the quantity of heat that should be supplied to 50 g of x to increase its temperature from 30°C to 50°C .
- (iv) Alcohol in glass thermometers are not suitable to measure the temperatures of x and y . What is the reason for this?

(D) The diagram shows a temporary gate constructed at a railway crossing. Assume that its bar is uniform and has a negligible mass.



- (i) What is the advantage of placing the pivot C close to A ?
- (ii) What is the minimum force that should be applied at P to close the gate.
- (iii) To move the gate, a force greater than the calculated force (P) should be applied. Why is it so?
- (iv) State a change that can be made to move the gate with a smaller force P .
