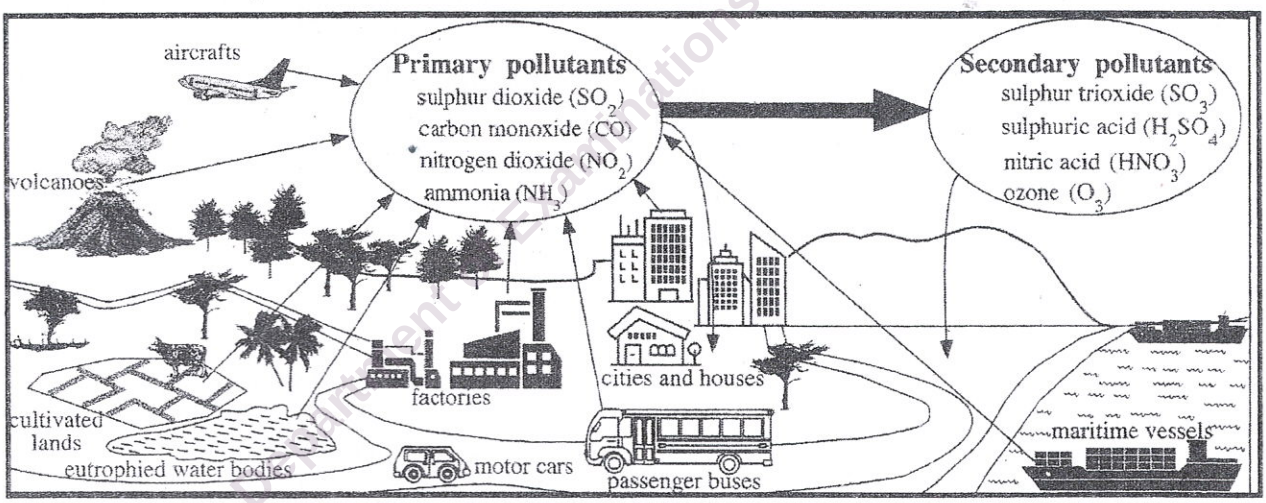
Confidential

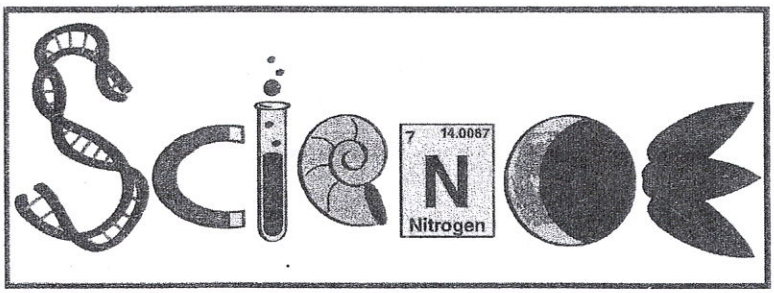
Department of Examinations - Sri Lanka

G. C. E. (O/L) Examination - 2020

34 - Science

Marking Scheme





This document has been prepared for the use of Marking Examiners. Some changes would be made according to the views presented at the Chief Examiners' meeting

Amendments to be included

Department of Examinations, Sri Lanka

G.C.E. (Ordinary Level) Examination - 2020

34 - Science

Marking Scheme

PAPER I

Number of questions	=	40
Marks awarded for the correct answer of each question	=	1
Total marks	=	1 x 40 = 40

PAPER II

Part A

Consists of 4 compulsory questions.

Marks awarded for all correct answers of one question	=	15
Total marks for the 4 questions	=	15 x 4 = 60

Part B

Consists of 5 questions.

Only 3 selected questions must be answered.

Marks awarded for all correct answers of one question	=	20
Total marks for 3 questions	=	20 x 3 = 60
Marks for PAPER I	=	40
Marks for the two parts A and B in PAPER II	=	120
Final Marks	=	**40 + (120 ÷ 2)**
	=	**100**

***Note : Final mark of each answer script is not calculated in the marking board.**

G.C.E. (O/L) Examination - 2020
Common techniques of marking answer scripts.

It is compulsory to adhere to the following standard method in marking answer scripts and entering marks into the mark sheets.

1. All assistant examiners must use a red colour ball point pen for marking answer scripts.
2. Chief Examiner must use a mauve color pen.
3. Note down Examiner's Code Number and initials on the front page of each answer script. The digits must be written clearly when marks are indicated.
4. Write off any numerals written wrong with a clear single line and authenticate the alterations with Examiner's signature.
5. Write down marks of each subsection of each question in a △ as a rational number and write down the final marks of each question as a rational number in a □. Use the column assigned for examiners to write down marks.
6. The arithmetic checker (EMF) must use a a blue or black pen to indicate the checking.

Example: **Question No. 03**

(i) ..... √ 4/5

(ii) ..... √ 3/5

(iii) ..... √ 3/5

03 Total → 10/15

MCQ answer scripts:

01. Preparation of Templates
   (i) Mark the correct options on the template according to the Marking Scheme.
   (ii) Cut off the marked windows with a blade.
   (iii) Cut off the cages for Index Number and the number of correct options so as to be able to place the template correctly on the answer script.
   (iv) Cut off a blank space to the right of each options column to mark right or wrong.
   (v) Get the approval for the prepared template from the Chief Examiner.

02. **Then, check the answer scripts carefully. If there are more than one or no answers marked to a certain question write off the options with a line. Sometimes candidates may have erased an option marked previously and selected another option. In such occasions, if the erasure is not clear write off those options too.**

03. Place the template on the answer script correctly. Mark the right answers with a '√' and the wrong answers with a 'X'. Write down the number of correct answers inside the cage given under each column. Then, add those numbers and write the number of correct answers in the relevant cage. Write the converted mark in the relevant cage in the occasions where marks have to be converted.

Structured essay type and essay type answer scripts:

1. Cross off any pages left blank by candidates. Underline wrong or unsuitable answers and mark them as wrong. Show areas where marks can be offered with check marks.

2. Use the right margin of the overland paper to write down the marks.
3. Write down the marks given for each question against the question number in the relevant cage on the front page in two digits. Selection of questions should be in accordance with the instructions given in the question paper. Mark all answers and transfer the marks to the front page. Write off answers with lower marks if extra questions have been answered against instructions.

4. Add the total carefully and write it in the relevant cage on the front page. Turn pages of answer script and add all the marks given for all answers again. Check whether that total tallies with the total marks written on the front page.

Preparation of Mark Sheets.

I. Except for the subjects with a single question paper, final marks of papers will not be calculated within the evaluation board.

II. The Final mark relavant to each paper must be entered to the mark sheets separately.

III. Enter marks of paper I in "Total Marks" column of the mark sheet and write them in words as well.

IV. When the mark sheet of paper II is prepared, the final mark should be written in "Total marks" column after entering detailed marks.

V. For the subject 43 Art, Paper I, paper II and Paper III Marks should be entered numerically in the separate mark sheets and should also be written in words.

VI. For subjects 21 - Sinhala language and literature and 22 - Tamil Language and literature, paper I marks once entered numerically should be written in words. Use separate mark sheets for the papers II and III and enter the total marks in the "Total marks column" after entering the relevant detailed marks.

Note

I. Final marks for paper I, paper II or paper III should always be entered to the mark sheet as a whole number. They should never be kept as decimals or half values.

II. The examiner who entered marks, the examiner who checked marks, the EMF and the chief examiner must certify the accuracy in all page of the mark sheets with their code numbers and signature.

***

OL/2020/34/E-I

34 E I

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2020
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2020
General Certificate of Education (Ord. Level) Examination, 2020

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 alternatives* (1), (2), (3), (4) *which you consider is correct or most appropriate.*
- ***Mark a cross*** (×) ***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.*

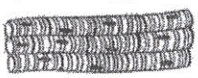
1. The fundamental structural and functional unit of life is the
(1) cell. (2) tissue. (3) organ. (4) system.

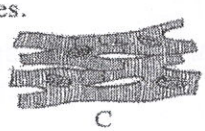
2. What is the pair of subatomic particles which attract each other?
(1) electrons and neutrons (2) electrons and protons
(3) protons and neutrons (4) electrons and electrons

3. The unit of momentum is
(1) $kg\ m\ s^{-1}$. (2) $kg\ m\ s^{-2}$. (3) $kg\ m^{-1}\ s^{-1}$. (4) $kg\ m^{2}\ s^{-2}$.

4. The figures A, B and C below indicate three types of muscle tissues.


A


B


C

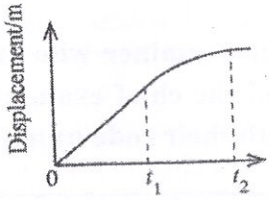
A, B and C above respectively are
(1) smooth muscle, cardiac muscle and skeletal muscle tissues.
(2) skeletal muscle, smooth muscle and cardiac muscle tissues.
(3) smooth muscle, skeletal muscle and cardiac muscle tissues.
(4) cardiac muscle, skeletal muscle and smooth muscle tissues.

5. Which of the following is the molecule with highest number of covalent bonds?
(1) O_2 (2) N_2 (3) NH_3 (4) CO_2

6. Heat is transmitted from the Sun to the Earth by
(1) radiation. (2) conduction.
(3) convection. (4) radiation and convection.

7. As was extracted by a student from an environmental pyramid, that ecosystem has one producer, eight prim
consumers and twenty three secondary consumers. The student has extracted this information from a
(1) upright number pyramid. (2) inverted number pyramid.
(3) upright biomass pyramid. (4) inverted biomass pyramid.

8. Here is shown the displacement-time graph of the motion of an object. During the time intervals from 0 to t_1 and t_1 to t_2, the nature of the motion of the object respectively is,
(1) a uniform velocity and an acceleration.
(2) a uniform velocity and a retardation.
(3) a uniform acceleration and a retardation.
(4) a uniform retardation and an acceleration.



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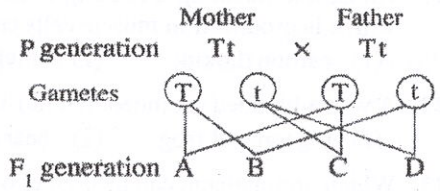
● Questions **9** and **10** are based on the following information and the illustration. Production of haemoglobin is disturbed by thalassemia, an inherited disease caused by the gene mutation in a somatic chromosome. With regard to the production of haemoglobin naturally, the dominant gene is T while the mutant recessive gene is t. A, B, C, and D indicate the F_1 generation.



9. A thalassemia patient belonging to the F_1 generation is
(1) A. (2) B. (3) C. (4) D.

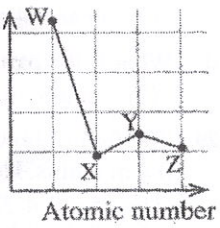
10. The ratio among the thalassemia patients, healthy disease carriers and healthy individuals belonging to the F_1 generation is
(1) 1 : 1 : 1 . (2) 1 : 1 : 2 . (3) 1 : 2 : 1 . (4) 2 : 1 : 1 .

11. Which statement is always true about the magnitude of displacement of a certain object?
(1) greater than the distance moved (2) equal to the distance moved
(3) lesser than the distance moved (4) either equal to or less than the distance moved

12. The electronic configurations of the atoms of two elements X and Y are 2, 8, 1 and 2, 8, 7 respectively. Of the following statements about the pair of those elements, which statement is **false**?
(1) located in the same period in the Periodic Table
(2) located in the same group in the Periodic Table
(3) chemically combine forming ionic bonds
(4) combine and form the compound with the chemical formula XY

13. What is the number of O_2 molecules contained in 64 g of oxygen gas? (O = 16)
(1) 6.022×10^{23} (2) $2 \times 6.022 \times 10^{23}$ (3) $4 \times 6.022 \times 10^{23}$ (4) $64 \times 6.022 \times 10^{23}$

14. W, X, Y and Z are four elements consecutively placed in the Periodic Table with atomic numbers below 20. The graph indicates how their first ionisation energy (I_1) varies against the atomic number. In which group of the Periodic Table is Y placed?
(1) I (2) II
(3) III (4) IV



15. The substances acting as the main components providing energy for the functioning of the human body are
(1) proteins and lipids. (2) proteins and vitamins.
(3) carbohydrates and lipids. (4) carbohydrates and proteins.

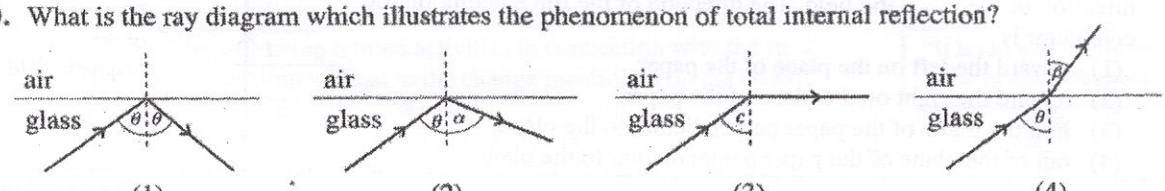
16. A person's glucose level in the blood has increased above the optimum level. Which of the following food items should he consume minimally?
(1) meat (2) milk (3) green gram (mung/payaru) (4) bread

17. Select the **false** statement about nucleic acids.
(1) building unit is called nucleotide (2) a natural polymer
(3) store hereditory information (4) contain the elements C, H, O and N only

18. Examples for the seeds/fruits dispersed by water, wind and explosive mechanism respectively are
(1) Ceylon almond(kottamba/kaththappu), hora and mango. (2) lotus, castor (endaru/amanakku) and rubber.
(3) coconut, milkweed (vara/erukkalai) and rubber. (4) jack, cotton and okra (bandakka/vendi).

19. Which of the following **does not** pass into the foetus from the mother through the umbilical cord?
(1) blood (2) nutrients (3) oxygen (4) pathogens

20. What is the ray diagram which illustrates the phenomenon of total internal reflection?



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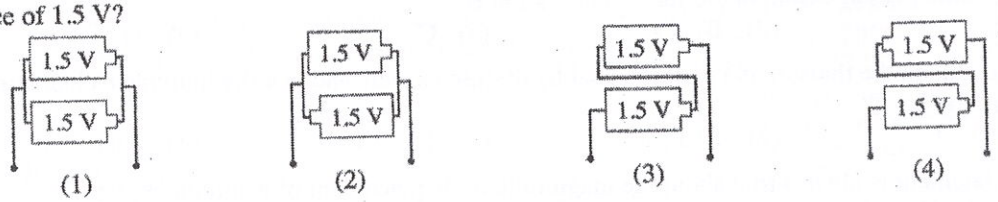
21. An athlete finishing a running event suffered from a cramp in his leg. What is the chemical compound which is produced in muscle cells causing the cramp?
(1) carbon dioxide (2) ethyl alcohol (3) lactic acid (4) acetic acid

22. A warm-blooded (homoeothermic) animal and a cold-blood (poikilothermic) animal respectively are
(1) pigeon and frog. (2) bear and rat. (3) rat snake and whale. (4) crocodile and tortoise.

23. Which arrangement can be used to obtain a voltage of 3 V from two dry cells each with an electromotive force of 1.5 V?



24. What is the metal that reacts with hot water but not with cold water?
(1) sodium (2) magnesium (3) aluminium (4) calcium

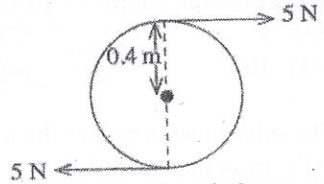
25. What is the correct statement about the Covid-19 virus?
(1) can be observed by the optical microscope (2) carries out metabolic activities
(3) bears a nucleus with DNA (4) shows living as well as non-living characteristics

26. When salt is extracted from sea water in a saltern, what is the compound that precipitates along with NaCl?
(1) Na_2SO_4 (2) $MgCl_2$ (3) $CaCO_3$ (4) $CaSO_4$

27. The maximum upthrust exerted by water on a certain object is less than the weight of the object. Then, the object will
(1) float on the water surface. (2) float partly immersed in water.
(3) float fully immersed in water. (4) sink fully in water.

28. What is the part common to the human digestive system and the human respiratory system?
(1) mouth (2) oesophagus (3) pharynx (4) larynx

29. The figure shows how a couple of forces is applied to rotate a wheel of 0.4 m radius. How much is the moment of this couple?
(1) 5×0.4 Nm (2) 5×0.8 Nm
(3) $5 \times 5 \times 0.4$ Nm (4) $5 \times 5 \times 0.8$ Nm

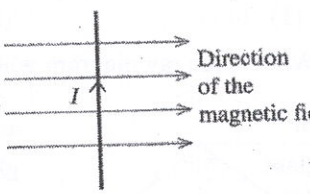


30. What is the mole fraction of O_2 in a mixture containing 96 g of oxygen gas (O_2) and 56 g of nitrogen ga (N_2)? (N = 14, O = 16)
(1) $\frac{1}{5}$ (2) $\frac{2}{5}$ (3) $\frac{3}{5}$ (4) $\frac{4}{5}$

31. Given below are four ways by which zinc metal and hydrochloric acid were reacted at room temperatur In which way is hydrogen gas liberated with the highest speed?
(1) zinc granules + dilute hydrochloric (2) zinc granules + concentrated hydrochloric
(3) zinc powder + dilute hydrochloric (4) zinc powder + concentrated hydrochloric

32. Between a strong acid and a strong base,
(1) an exothermic neutralization reaction occurs. (2) an endothermic neutralization reaction occurs
(3) an exothermic combination reaction occurs. (4) an endothermic combination reaction occurs.

33. A conductor carrying an electric current I, is kept perpendicular to a magnetic filed as shown in the diagram. Horizontal lines indicate the direction of the magnetic field. The direction of the force acting on the conductor is
(1) toward the left on the plane of the paper.
(2) toward the right on the plane of the paper.
(3) into the plane of the paper perpendicular to the plane.
(4) out of the plane of the paper perpendicular to the plane.



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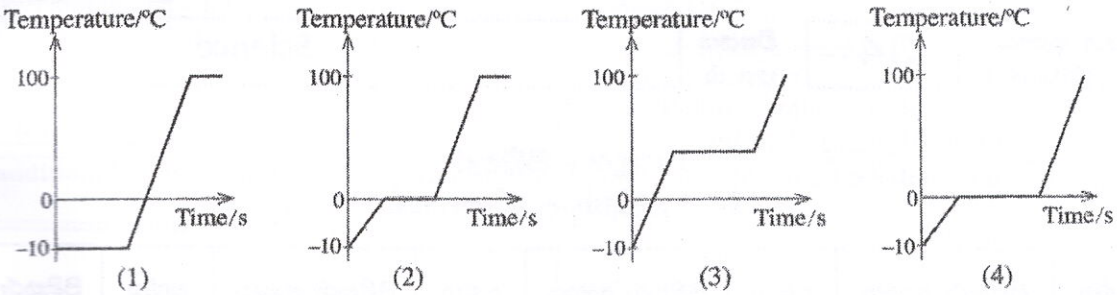
34. Under normal atmospheric pressure, a pure block of ice at temperature –10 °C was heated at a uniform rate until it was turned into liquid water and then for some time after the water started to boil. Which graph correctly indicates the variation of the temperature of the system with time?



35. Consider the following statements presented regarding natural rubber.

A - It is a linear polymer. B - Isoprene is the monomer. C - There are cross links among the chains.

Of these statements

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

36. Corrosion of iron can be controlled by keeping iron in contact with the bivalent metal M. What is the half reaction to which the metal M is subjected here?

(1) $M(s) \longrightarrow M^{2+}(aq) + 2e$
(2) $M^{2+}(aq) \longrightarrow M(s) + 2e$
(3) $M^{2+}(aq) + 2e \longrightarrow M(s)$
(4) $M(s) \longrightarrow M^{+}(aq) + e$

37. A 4 N force and a 3 N force are applied on an object at the same instance. Consider the following statements given about the magnitude of the resultant obtainable at that occasion.

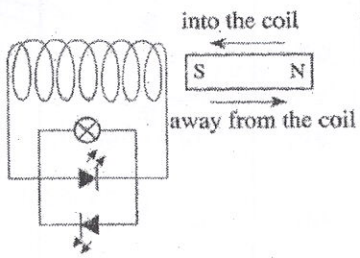
A - The maximum magnitude of the resultant obtainable is 7 N.
B - The minimum magnitude of the resultant obtainable is 1 N.
C - The magnitude of the resultant obtainable is always 5 N.

Of the above, the correct statement(s) is / are

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

38. A strong bar magnet is moved into and away from an insulated wire coil with a large number of turns as illustrated by the diagram. What is the correct observation about the instances of movement of the magnet?

(1) In both instances, both the bulb and two LEDs light simultaneously.
(2) In both instances, the bulb lights and only one LED lights.
(3) The bulb and one LED light only when moved into the coil.
(4) The bulb and one LED light only when moved away from the coil.



39. Consider the following statements.

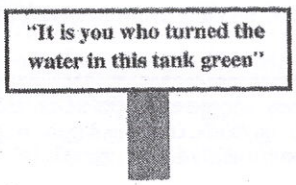
A - Biomagnification occurs along a food chain.
B - Toxic chemical pollutants concentrate more in the upper trophic levels of a food chain.

Of the above statements,

(1) both A and B are true.
(2) A is true while B is false.
(3) A is false while B is true.
(4) both A and B are false.

40. A statement displayed on a board near a tank is shown in the figure. Which of the following human activities in connection with the tank would have contributed most to the change mentioned on the board?

(1) clearing the area above the tank
(2) increase in algae population due to fishing
(3) accumulation of oil and grease due to vehicle wash
(4) addition of faecal and excretory matter to the water



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ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம்

NEW

අ.පො.ස. (සා.පෙළ) විභාගය - 2020
க.பொ.த (சா.தர)ப் பரீட்சை - 2020

විෂය අංකය
பாட இலக்கம் 34

විෂය
பாடம் Science

I පත්‍රය - පිළිතුරු
I பத்திரம் - விடைகள்

ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.
01.	1	11.	4	21.	3	31.	4
02.	2	12.	2	22.	1	32.	1
03.	1	13.	2	23.	3	33.	3
04.	3	14.	2	24.	2	34.	2
05.	4	15.	3	25.	4	35.	2
06.	1	16.	4	26.	2	36.	1
07.	2	17.	4	27.	4	37.	4
08.	2	18.	3	28.	3	38.	2
09.	4	19.	1	29.	2	39.	1
10.	3	20.	1	30.	3	40.	4

විශේෂ උපදෙස්
விசேட அறிவுறுத்தல்
එක් පිළිතුරකට ලකුණු
ஒரு சரியான விடைக்கு
01
බැගින්
புள்ளி வீதம்

මුළු ලකුණු / மொத்தப் புள்ளிகள் 01 x 40 = 40

පහත නිදසුනෙහි දැක්වෙන පරිදි බහුවරණ උත්තරපත්‍රයේ අවසාන සීරුවේ ලකුණු ඇතුළත් කරන්න.
கீழ் குறிப்பிடப்பட்டிருக்கும் உதாரணத்திற்கு அமைய பல்தேர்வு வினாக்களுக்குரிய புள்ளிகளை பல்தேர்வு வினாப்பத்திரத்தின் இறுதியில் பதிக.

නිවැරදි පිළිතුරු සංඛ්‍යාව
சரியான விடைகளின் தொகை 40

I පත්‍රයේ මුළු ලකුණු
பத்திரம் I இன் மொத்தப்புள்ளி 40

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka
Department of Examinations, Sri Lanka

34 | E | II

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2020
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2020
General Certificate of Education (Ord. Level) Examination, 2020

විද්‍යාව II
விஞ்ஞானம் II
Science II

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

අමතර කියවීම් කාලය - මිනිත්තු 10 යි
மேலதிக வாசிப்பு நேரம் - 10 நிமிடங்கள்
Additional Reading Time - 10 minutes

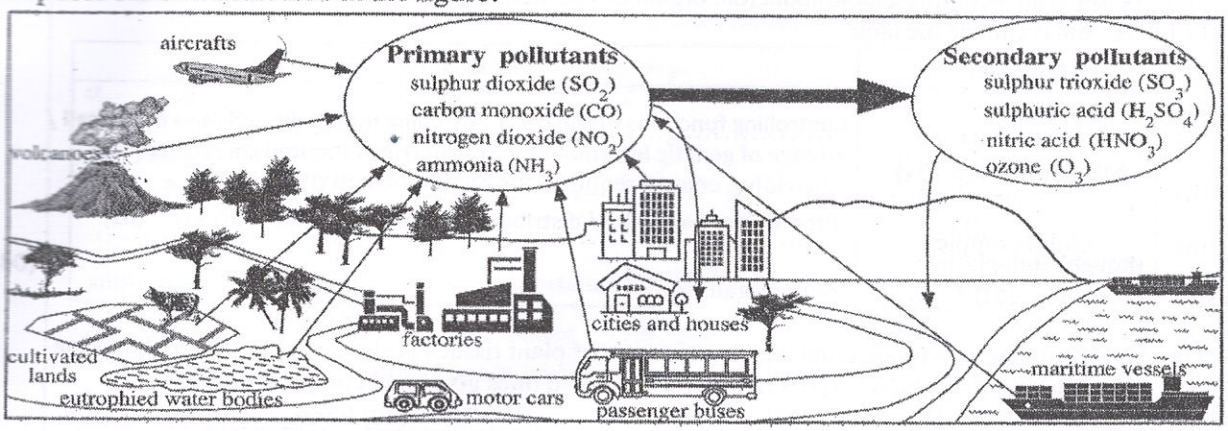
Use additional reading time to go through the question paper, select the questions you will answer and decide which of them you will prioritise.

Index Number: .....

Instructions:
- ✱ ***Write your answers in neat handwriting.***
- ✱ *Answer the **four** questions in* **Part A**, *in the space provided.*
- ✱ *Of the five questions in* **Part B** *answer **three** questions only.*
- ✱ ***After answering, tie** **Part A** **and the answer script of** **Part B** **together and hand over.***

Part A

1. (A) The following figure indicates several common sources of pollutants and the gaseous pollutants produced by them. The primary pollutants indicated in it are the gaseous pollutants directly added to the atmosphere. The secondary pollutants produced from the primary pollutants undergoing chemical changes in the atmosphere are also indicated in the figure.

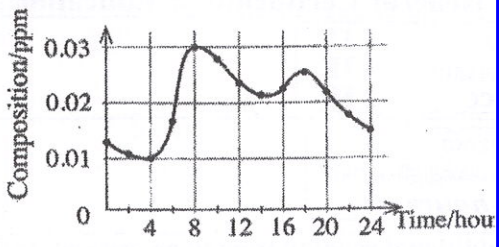


Select an **example** relevant to each of the following statements from the figure and fill in the blanks in the table.

(i)	A pollutant source producing primary pollutants without human interference.	Volcanoes	(01)
(ii)	A secondary pollutant affecting living beings favourably in the upper regions of the atmosphere and unfavourably in the lower regions of the atmosphere.	Ozone / O_3 / Trioxygen	(01)
(iii)	A primary pollutant producing secondary pollutants which contribute to acid rains.	NO_2 / Nitrogen dioxide SO_2 / Sulphur dioxide	(01)
(iv)	A primary pollutant with basic properties that liberates from the eutrophied water bodies.	NH_3 / Ammonia	(01)
(v)	A secondary pollutant that falls on soil and contributes to provide a main nutrient essential for plant growth.	HNO_3 / Nitric acid (Free Mark)	(01)
(vi)	If the food mileage is shortened, the amount of gaseous pollutants released from this pollutant source is reduced.	Air crafts/Motor Car/Ships/ Passenger Buses	(01)
(vii)	If this mode of transport is selected, your carbon foot print during an inland tour can be minimized.	Passenger buses	(01)

[See page two

(*B*) In a populated city, the atmospheric nitrogen dioxide gas (NO_2) composition was measured during a da starting from Sunday midnight to Monday midnight. The variation graph of the composition of NO_2 draw using those data is given below. Answer the following questions based on the graph.



(i) What is the maximum and minimum NO_2 composition existed on the relevant day?
maximum: 0.03(ppm) (01) minimum: 0.01(ppm)(01)
For correct 2 numbers without units 1 mark

(ii) In which hour of the day is the maximum NO_2 composition recorded? 8 (01)

(iii) According to the above graph, in the above city, two occasions are seen in which the NO_2 composition assumes a high value in a day. Give a reason for it. At that time traffic jam in the roads is high. / Any other suitable answer which reflect the above idea (02) Marks

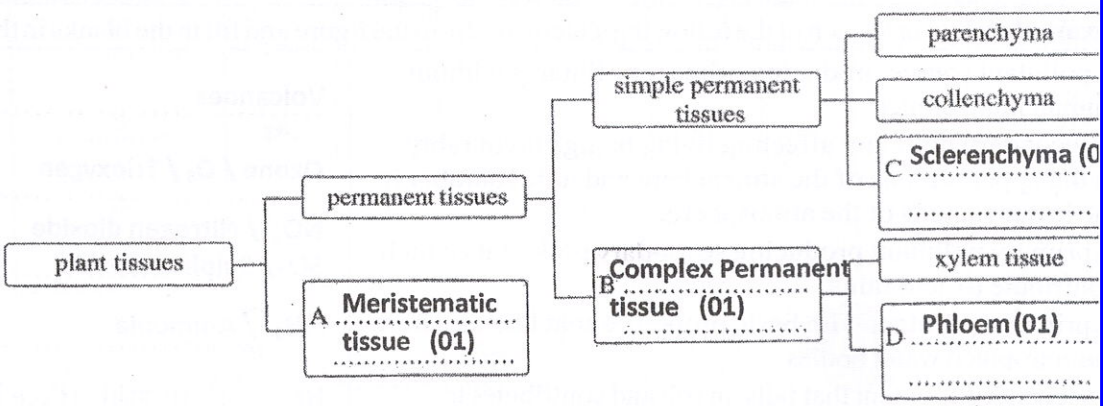
(iv) In the above city, the increase in the NO_2 composition in the forenoon is greater than that of th afternoon. Give a reason for it? Traffic jam in the forenoon is higher than that of afternoon / Any other suitable answer which reflect the above idea (02) Marks

(v) Name another primary gaseous pollutant which would indicate a variation that corresponds to th variation of NO_2 composition during the relevant day in the above city. Sulphur dioxide/SO_2/ Carbon monoxide/CO/Carbon dioxide/CO_2 Any one of these answers (01) Mark

2. (*A*) Given below is an incomplete table about four organelles existing in a cell and their main functions. Fill the blanks and complete the table.

	Organelle	Function
(i)	Nucleus	Controlling functions of the cell/Controlling metabolic activities of the ce Storage of genetic information / Transferring inherited characters (01)
(ii)	Mitochondrion (01)	providing energy required for metabolic activities
(iii)	Golgi complex	Production/ packaging/ distribution of Secretary Substances (01)
(iv)	(Rough) Endoplasmic reticulum (01)	protein transport

(*B*) (i) An incomplete chart indicating the classification of plant tissues is shown below. Write the tiss types relevant to the boxes A, B, C and D on the dotted lines given and complete the table.

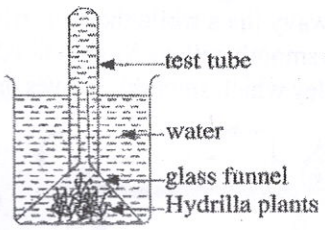


(ii) What is the type of tissue in which photosynthesis occurs most? Parenchyma

(iii) Name the type of tissue which contains seive tube elements. Phloem (tissue)

(C) An apparatus set by a group of students to investigate a product of photosynthesis is shown in the diagram.

(i) What is the gas collected in the test tube when this apparatus is kept in sunlight? Oxygen / O_2 (01)



(ii) State a test that can be done to identify that gas and the observation you make during the test.

Test : Inserting a glowing splinter into the tube (01)

Observation : The Splinter will burn with a (bright) flame (01) (02)

(iii) A new apparatus similar to the above apparatus was made by putting water saturated with carbon dioxide gas instead of normal water.

(a) State an observation that could be expected with regard to the evolution of gas bubbles in the new apparatus when comparing with the evolution of gas bubbles in the first apparatus under similar environmental conditions.

(A) Duration of evolving gas bubbles is high (B) Rate of evolving gas bubbles is high (01) (01)

(b) Give reasons for the observation you mentioned above.

(A) As the amount of dissolved CO_2 is high supply of CO_2 needed for photosynthesis continues for a long time.

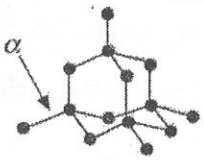
(B) Rate of photosynthesis increases with the increase of CO_2 concentration (01) (01)

15

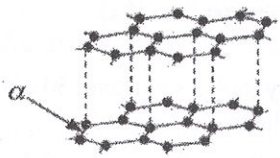
3. (A) The following figures indicate the lattice structures of three solid substances P, Q and R.

(i) Identify them and fill in the relevant blanks selecting the names of those substances and the lattice structures from the box given below.

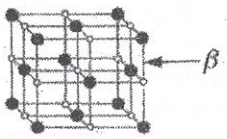
sodium chloride, diamond, graphite, ionic, atomic



(P)



(Q)



(R)

substance : Diamond (01) substance Graphite (01) substance : Sodium Chloride (01)

lattice : Atomic (01) lattice : atomic lattice Ionic (01) (05)

(ii) Write the names of the chemical bonds labelled α and β in the lattice structures.

α : Covalent bond (01) β : Ionic bond (01) (02)

(iii) Of the substances P, Q and R,

(a) which substance conducts electricity in the solid state? Q / Graphite (01) (01)

(b) which substance has the highest hardness? P / Diamond (01) (01)

(B) Given below are two reactions in connection with the metal M.

M + oxygen gas $\xrightarrow{\text{heat}}$ X (a white powder)

M + Y $\longrightarrow$ magnesium chloride (an aqueous solution) + Z (a colourless gas)

(i) Identify M, X, Y and Z and write their names or chemical formulae on the dotted line.

M : Mg / Magnesium (01) X : MgO / Magnesium Oxide (01)

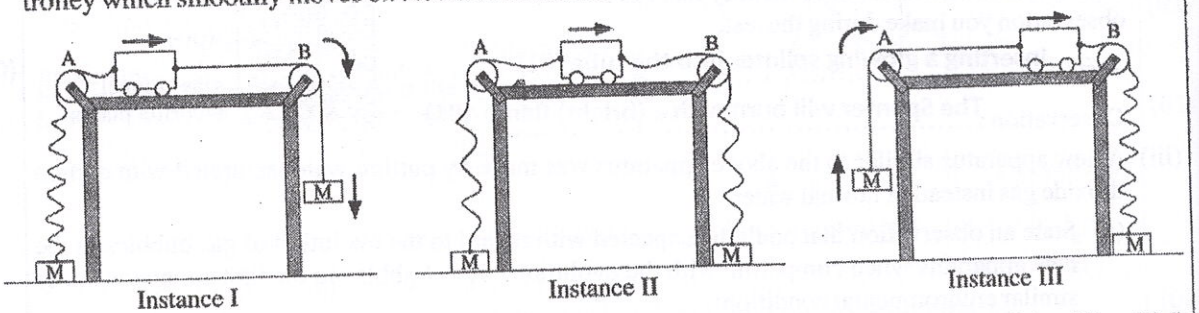
Y HCl/Hydrochloric (acid)/Hydrogen Chloride (01) Z : H_2 / Hydrogen (01) (04)

(ii) In compound X, the ionic form in which M exists is M^{2+}. Write the chemical symbol of the ionic form in which oxygen exists in that compound. O^{2-} (01) (01)

(iii) X is sparingly soluble in water. Which colour litmus papers give a colour change when testing that aqueous solution with litmus papers? Red (01) (01)

15

4. (A) In an activity to demonstrate Newton's laws, a trolley connected to two equal masses M with strings is used. The figures show three instances in the activity. In those instances, the slack strings are represented by wavy lines while the taut strings are represented by straight lines. The strings are made to pass over two smooth pulleys A and B fixed to the two ends of a table. Arrows indicate the direction of motion of the trolley which smoothly moves on the horizontal table and the directions of motion of the masses.



Instance I Instance II Instance III

(i) Inserting appropriately the terms given in the following box, complete the following table which describes the nature of motion of the trolley in the instances I, II and III.

uniform retardation, uniform acceleration, uniform velocity, Newton's first law, Newton's second law

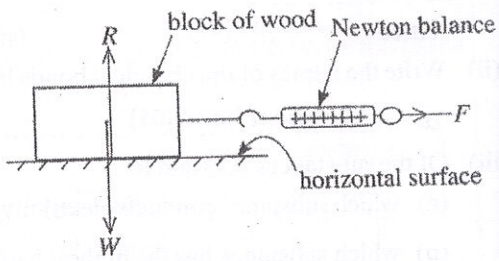
Instance	Nature of motion of the trolley	Newton's law that describes the nature of motion of the trolley
I	Uniform acceleration (01)	Newton's 2nd Law (01)
II	Uniform Velocity (01)	Newton's 1st Law (01)
III	Uniform retardation/deceleration (01)	Newton's second law

(ii) In one of the above instances, the trolley took 5 s to travel 50 cm on the table with uniform velocity. Find the uniform velocity with which the trolley moved.

Velocity = $\frac{\text{Displacement (s)}}{\text{Time (t)}} = \frac{50\text{ cm}}{5\text{ s}} = 10\text{ cm s}^{-1}$ / $\frac{0.5\text{ m}}{5\text{ s}} = 0.1\text{ m s}^{-1}$

(01) mark for the equation or substitution and (01) mark for the answer with unit.

(B) The figure shows a cuboidal block of wood used to examine how the frictional force between a horizontal surface and an object placed on it changes. The block of wood is connected to a Newton balance by a string and a horizontal, external force F is applied. The experiment is conducted by increasing the value of the force F gradually from zero.



(i) Name the forces indicated by R and W.

R : Normal Reaction /Perpendicular reaction (01)

W : Weight / Gravitational Force/Force exerted on the table by the object (01)

(ii) The block of wood stays at rest until F is increased to a certain value from zero. By what name is the frictional force acting on the block of wood known before it starts to move?

Static Frictional Force (01)

(iii) At the moment the motion starts, the frictional force acting on the block of wood reaches the maximum value.

(a) What is the name of that maximum frictional force? Limiting frictional force (01)

(b) Write **two** factors on which the magnitude of that frictional force depends.

Normal reaction OR Perpendicular reaction / Nature of the contact Surfaces (02)

(c) Suggest a method that can be practically applied to change one factor you stated in (b) above

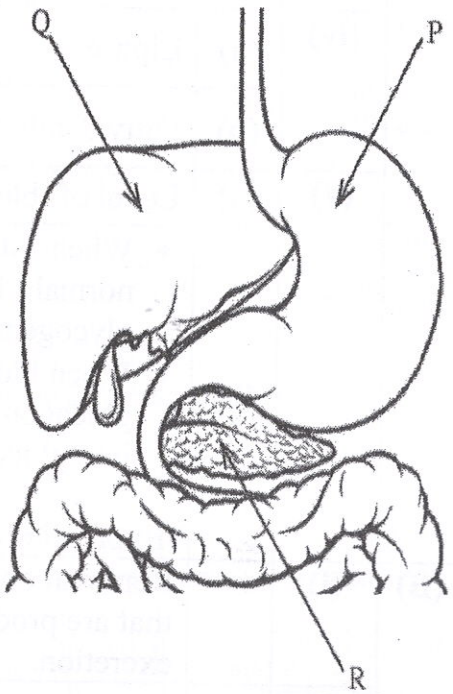
A techniques such applying sand paper or powder to change the nature of contact surface

A technique such a placing any mass on the wooden block to change the normal reaction (01)

Part B

- Answer only **three** questions from the questions No. **5, 6, 7, 8** and **9**.

5. (*A*) Given below is a sketch of a part of the human digestive system.



(i) Name the parts labelled P, Q and R.

(ii) Describe briefly how food is subjected to mechanical digestion in P.

(iii) A secretion essential for the emulsification of lipids contained in food is produced by Q. Name that secretion.

(iv) (a) What is the enzyme which is secreted by R and contributes to digest lipids?

(b) State the **two** products formed by the action of that enzyme on lipids.

(v) The pair of hormones insulin and glucagon produced by R contributes to regulate the internal environment of the body.

(a) What is the factor that is regulated in the internal environment of the body by the action of those hormones?

(b) Explain briefly how those hormones contribute to regulate the factor you stated in (a) above.

(*B*) Kidneys are considered the main organs which perform nitrogenous excretion in humans.

(i) What is excretion?

(ii) Name a nitrogenous excretory product removed by kidneys.

(iii) What is the structural and functional unit of the kidneys?

(iv) One step in the process of forming urine in the structural and functional unit of the kidneys is known as **secretion**.

(a) Describe briefly how secretion occurs.

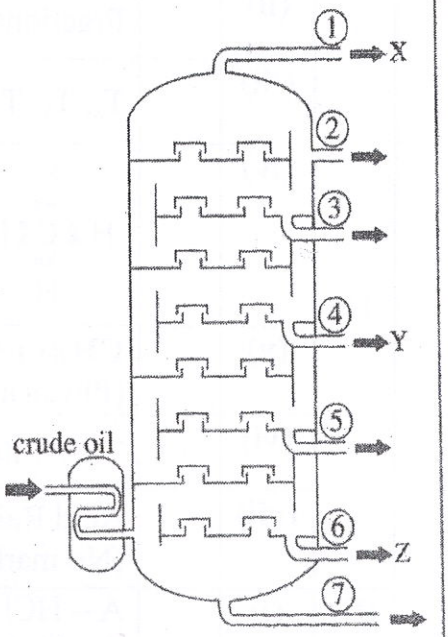
(b) State the other **two** steps in the formation of urine.

(20 marks)

5)
2)
02)
(01)
(01)
(02)
15
(02)

05	(A)	(i)		P – Stomach (01) Q – Liver (01) R – Pancreases (01)	03
		(ii)		The function of mussel (01) due to the peristaltic activity of mussels / contraction and relaxation (01) in the stomach wall the food is broken in to small pieces	02
		(iii)		Bile	01
		(iv)	(a)	Lipase (01)	03
			(b)	Fatty Acids & Glycerol (02)	
		(v)	(a)	Level of (blood)Glucose (01)	03
			(b)	• When blood glucose level is greater than the normal level (excess), glucose converts into glycogen/fat by insulin hormone. (01) • When blood glucose level is less than the normal, glucagon acts on glycogen/fat in lever to convert it into glucose. (01) OR Expressing above ideas in word equations	
	(B)	(i)		Removal of the waste products (01) from the body that are produced during metabolism (01) is known as excretion.	02
		(ii)		Urea/ Uric Acid / Creatinine	01
		(iii)		Nephron	01
		(iv)	(a)	Entering some of the materials / H^+/ K^+/ NH_4^+/ Creatinine/Vitamin B & Drugs (01) in the blood capillaries associated with nephron to the tubules of nephron (01)	04
			(b)	Ultra Filtration (01) Selective reabsorption / Selective absorption (01)	
				Total Marks	(20)

6. (*A*) A longitudinal section of a fractionating tower used for refining crude oil is given below. Contained in abundance are the compound X in the fraction released from the outlet ①, compound Y in the fraction released from the outlet ④ and the compound Z in the fraction released from the outlet ⑥.



(i) By what common name is the group of organic compounds contained in abundance in crude oil known?

(ii) Name the crude oil refining technique employed in the tower.

(iii) The boiling points of the compounds X, Y and Z are T_X, T_Y and T_Z respectively. Write them in the ascending order.

(iv) X is a compound with a single carbon atom and containing carbon and hydrogen only. Draw the dot and cross diagram of a X molecule.

(v) Write the balanced chemical equation relevant to the complete combustion of one mole of compound X in oxygen gas.

(vi) The substance released from outlet ⑦ of the tower is used to construct roads. Name that substance.

(vii) State an environmental problem caused by the gaseous components that would be released to the environment during refining of crude oil.

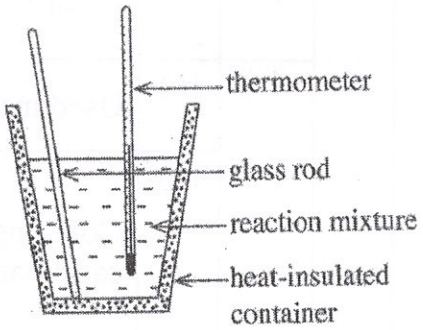
(*B*) A is a strong acid and B is a strong base. Two products are produced in the reaction between A and B. One of those products is sodium chloride (NaCl).

(i) Write the chemical formulae of the compounds A and B.

(ii) Name the compound that is produced as the other product during the reaction between A and B.

(iii) Describe briefly how the compound you stated in (ii) above is formed during the reaction between A and B.

(iv) An apparatus set up to determine the heat change associated with the reaction between A and B is shown in the diagram.



(a) In the apparatus, what measure has been taken to reduce the heat loss?

(b) Suggest a course of action which can be taken to reduce further the heat loss in this apparatus.

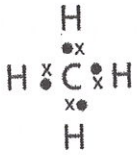
(v) 50 cm^3 each of A acid solution and B base solution of equal concentration were taken and mixed in the above apparatus. The temperature change occurred here was determined to be 10 °C.

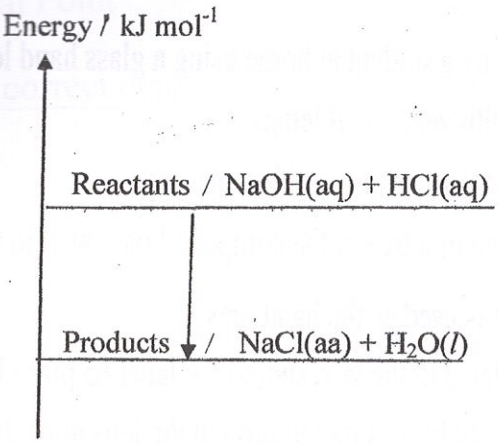
(a) What are the readings that should be taken to determine the above temperature change?

(b) Calculate the heat change associated with the above reaction. (The specific heat capacity of the reaction mixture is 5000 J kg^{-1} $°C^{-1}$ and its density is 1 g cm^{-3}.)

(vi) Sketch an energy level diagram to illustrate the energy change occurring in the chemical reaction between A and B above.

(20 marks)

(6)	(A)	(i)		Hydrocarbon / Alkane	01
		(ii)		Fractional distillation	01
		(iii)		T_x, T_y, T_z or $T_x<T_y<T_z$ or $T_z>T_y>T_x$	01
		(iv)			01
		(v)		$CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(g)$ (Physical states are not necessary)	01
		(vi)		Tar / Bitumen	01
		(vii)		Acid Rain / Photo Chemical Smog / Global Warming (No marks for greenhouse effect)	01
	(B)	(i)		A – HCl (01) B – NaOH (01)	02
		(ii)		Water / H_2O	01
		(iii)		By the combination of H^+ ions from A/ acid **(01)** and OH^- ions from B/ base **(01)** OR $Na^+ + OH^- + H^+ + Cl^- \longrightarrow Na^+ + Cl^- + H_2O_{(l)}$ **(01)** $H^+_{(aq)} + OH^-_{(aq)} \longrightarrow H_2O_{(l)}$ **(01)**	02
		(iv)	(a)	Used insulated vessels	02
			(b)	Covering with a Heat insulating lid such as wood, cardboard, regiform etc. / Placing in another vessel.	
		(v)	(a)	Starting / Initial Temperature A or B / reactants/ HCl, NaOH **(01)** Highest Temperature of mixture of HCl, NaOH / A, B **(01)** (No mark for final temperature)	04
			(b)	$Q = mc\theta$ / $= \frac{100}{1000}$ kg x 5000 $Jkg^{-1}\,^0C^{-1}$ x10 ^0C **(01)** = 5000 J **(01)**	

		(vi)		 Energy or kJ mol^{-1} (01) Reactants, products and downward arrow (01)	02
				Total Marks	20

7. (*A*) The following activities were done by a student at home using a glass hand lens.

Activity 1 - Reading a label with very small letters

Activity 2 - Burning a piece of dry cotton wool by solar rays

Activity 3 - Obtaining an image of a tree in the compound on a wall in the house

(i) Name the type of the lens that is used as the hand lens.

(ii) Between which two points related to the lens should the label be placed in Activity 1?

(iii) Indicate by a ray diagram how light rays travel through the lens in Activity 2.

(iv) Instead of the hand lens, what type of a mirror can be used to carry out Activity 2?

(v) State **two** characteristics of the image formed in Activity 3.

(vi) Name **two** instruments that are made using lenses of the type used for hand lenses.

(*B*) When brakes are applied to a normal motor vehicle at run, its kinetic energy is lost due to friction

(i) Brakes are applied to a motor vehicle of mass 1000 kg when running at a speed of 20 m s^{-1}.

(a) Calculate the kinetic energy of the vehicle at the instance just before applying brakes.

(b) Name **two** forms of energy to which the kinetic energy lost gets converted when applying br

(ii) A part of the kinetic energy lost when applying brakes to an electric motor vehicle is convert electrical energy and its battery is charged.

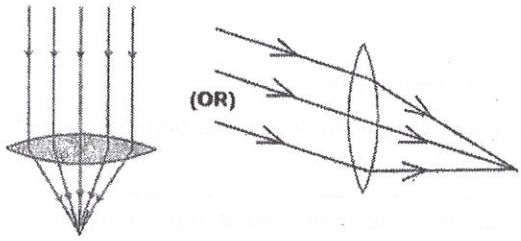
(a) Name the equipment that converts kinetic energy to electrical energy here.

(b) Name and describe briefly the phenomenon of converting lost kinetic energy of the vehi electrical energy.

(c) Name the equipment that converts the electrical energy supplied by the battery to kinetic e required to run the vehicle.

(d) The electromotive force of a battery used in electric motor vehicles is about 400 V. T composed of a set of cells where the electromotive force of one cell is 4 V. What is the mir number of cells required to make this battery?

(20 r

(7)	(A)	(i)		Converging lens / (Bi) Convex lens	01
		(ii)		C and F / O and F / Between the Optical center and focus / Focal Point Or For correct diagram (02)	02
		(iii)		 (02) Or Ray diagrams without arrow head (01)	02
		(iv)		Concave (mirror)	01
		(v)		Real, Smaller than the object/diminish, Inverted give marks for 02 characteristics (02)	02
		(vi)		Camera / Compound microscope, contact lens Telescopes / Projectors / Spectacles (any two)	02
	(B)	(i)	(a)	$E = \frac{1}{2} mv^2$ / $= \frac{1}{2} \times 1000 \times 20 \times 20$ (01) $= 200000$ J / $= 200$ kJ (01)	04
			(b)	Heat, sound ,elastic potential energy, mechanical energy, energy stored in springs in shock absorbers One mark each for any two answers (02)	
		(ii)	(a)	Dynamo / Electric generator / Alternator (01)	06
			(b)	Electromagnetic induction (01) The generation of an electromotive force / emf / potential difference (between the terminals) of a conductor (01) when the magnetic field changes across the conductor (01)	
			(c)	Motor/ AC motor / DC motor (01)	
			(d)	Number of Cells Required $= \frac{400V}{4V}$ / or $= 100$ (01)	
				Total Marks	(20)

8. (A) A student recorded as follows three animals and features of two animals indicated as P and Q as their names were unknown to him found in an okra (bandakka/vendi) cultivation.

- snail
- lizard
- greater caucal (etikukula/chenpakam)
- P - Has a thin, long and vermiform body. The body is divided into equal segments.
- Q - Bears jointed legs and wings.

Write answers to the following questions related to the animals observed.

(i) (a) Name the two vertebrate animals.

(b) What is the main characteristic on which the inclusion of those animals in the vertebrate group based?

(ii) According to the above observations, what is the animal phylum to which P belongs?

(iii) State another common characteristic specific to the animal species of the phylum to which Q belongs.

(iv) State a favourable effect and an unfavourable effect which can be expected to have caused by Q or the crop.

(v) State a primary consumer and a secondary consumer respectively in a food chain that contains animals observed in the okra cultivation.

(vi) A newspaper has printed greater coucal's scientific name as Centropus Sinensis. According to the rules of binomial nomenclature, state **two** errors seen in it.

(B) A cylindrical water tank is kept on the roof of a two storeyed house.

(i) Consider an occasion in which two identical water taps in the upper floor and the ground floor of the house are kept fully open at the same time.

(a) From the tap in which floor does water flow out with higher speed?

(b) Give the reason for your answer.

(ii) The inner cross sectional area of the tank is 1 m^2 and its height is 1 m. (Density of water is 1000 kg m^{-3} and acceleration due to gravity is 10 m s^{-2}.)

(a) What is the mass of water in the tank when it is completely filled with water?

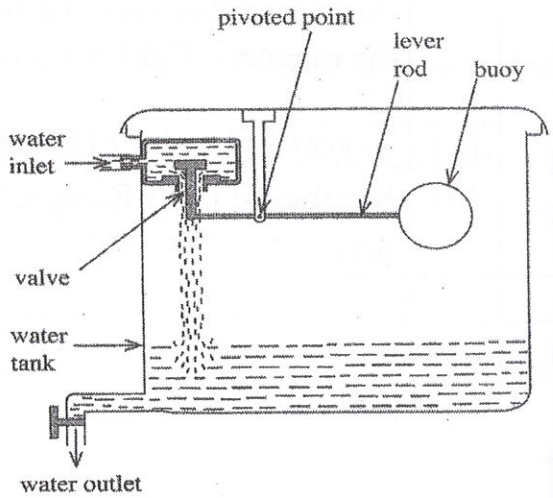
(b) What is the pressure exerted by water on the bottom of the tank when it is completely filled with water?

(iii) The diagram shows a lever arrangement made to prevent the overflow of water entering the tank. When water gets filled, the buoy lifts closing the valve and the entry of water stops.

(a) What is the force acting on the buoy at the position shown in the diagram?

(b) What is the extra force acting on the buoy from the time at which the water level rises and the buoy starts to submerge in water.

(c) State another advantage gained from this lever arrangement in addition to the prevention of overflow of water.

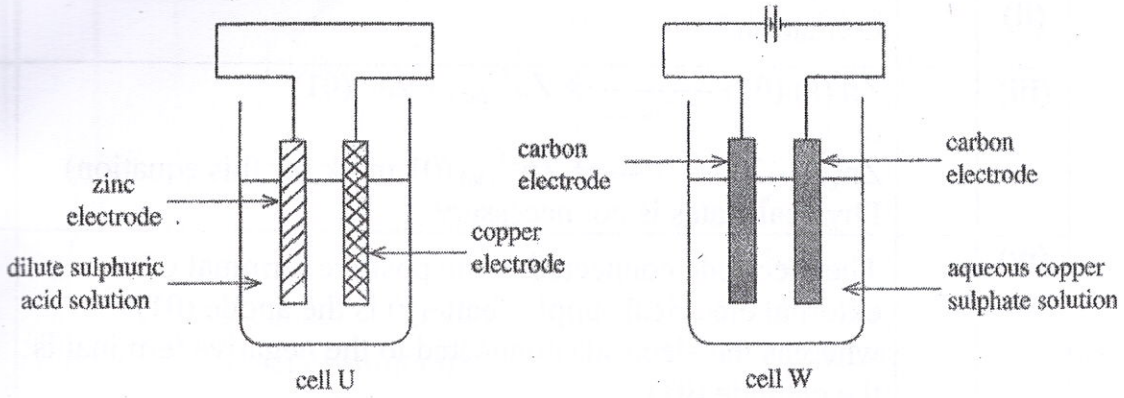


(20 marks)

(8)	(A)	(i)	(a)	Lizard **(01)** and Greater Caucal **(01)**	03
			(b)	Presence of a vertebral column / backbone **(01)**	
		(ii)		Annelida	01
		(iii)		• Body is segmented 2 or 3 several segments collectively from functional segments called Tagma. / Tagmatization • Presence of an (Chitin) exoskeleton. For one characteristic	01
		(iv)		Favorable: - • Contribution for the pollination • They aerate the soil / aeration of soil / Changing texture / Loosing the soil • Control insects and plant pests. • biological pests controller For one favorable effect **(01)** Unfavorable: - • Act as pests • Spreading of diseases • Destroying the crop roots (in many ways) • Consume leaves , flowers and fruits For one unfavorable effect **(01)**	02
		(v)		• Snail / Q **(01)** • Greater caucal (Etikukula) / Lizard / P **(01)**	02
		(vi)		• Not printed in italics/Printed in plain letters **(01)** • The first letter of the specific epithet is Capitalized/ Only the first letter should be capitalized **(01)**	02
	(B)	(i)	(a)	From the tap in the ground floor. (down stair) **(01)**	02
			(b)	Hydrostatic pressure is higher because of the height of the water column/ Because the height of the water column above the tap is higher or the potential energy is high because the height from ground floor to the tank is high.**(01)**	
		(ii)	(a)	Density $= \frac{mass}{Volume}$ Or	02

					Mass = Density × Volume Or m = d × V = 1000(kgm^{-3}) × 1(m^3) = 1000 (Kg) Equation or Substitution – (01) Answer – (01)	
			(b)		Pressure, P = hρg Or P = 1(m) × 1000 (kgm^{-3}) × 10 (ms^{-2}) = 10000 (Pa) Or Pressure = $\frac{Perpendicular\ Force}{Area}$ Or = $\frac{1000\ kg \times 10\ m\ s^{-}}{1\ m^3}$ = 10000 (Pa) Equation or Substitution – (01) Answer – (01)	
		(iii)	(a)		Weight of the buoy / gravitational force (01)	
			(b)		Up thrust (01)	
			(c)		• Maintaining the water level at a definite range • Maintaining the water pressure in the tank at a constant value • Economic advantage because of minimization of water wastage (water bill will be reduced, prevent wasting of time) (For any one of the above) (01)	
						Total Marks

9. (A) The cell U shown below is an electrochemical cell while the cell W is an electrolytic cell.



(i) In which cell above is chemical energy converted to electrical energy?

(ii) What is the name by which the anode reactions occurring in the two cells are known in common?

(iii) Indicate the half reaction occurring at the anode of the cell U by a chemical equation.

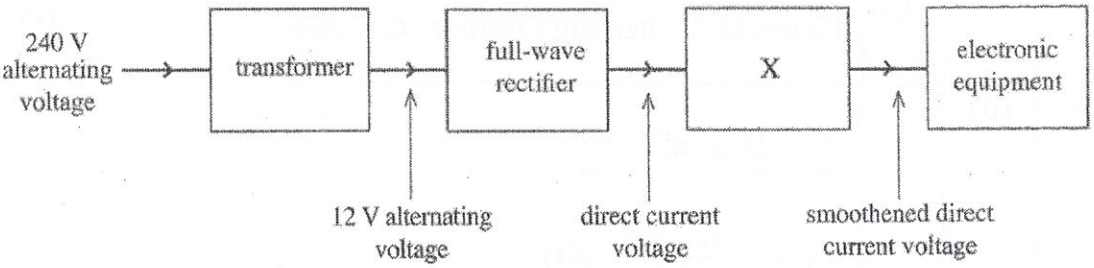
(iv) State the convention used to identify the anode and cathode in cell W.

(v) (a) What change in colour occurs in the electrolytic solution when cell W operates?

(b) Explain the reason for it.

(vi) Which electrode is dissolved when the above cells operate?

(*B*) In order to operate a certain household electronic equipment, the domestic electricity supply has to be converted to a low voltage, direct current electrical supply. For that, an arrangement consisting of the following parts is used.



(i) (a) What type of a transformer is connected to the above arrangement?

(b) In what coil in this transformer should wires of higher diameter be used? State the reason for it.

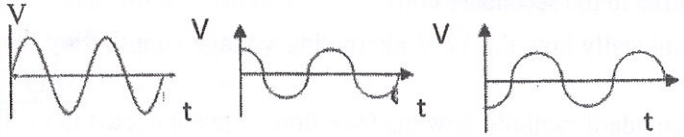
(ii) The number of turns in the primary coil of the above transformer is 1800. What should be the number of turns in the secondary coil?

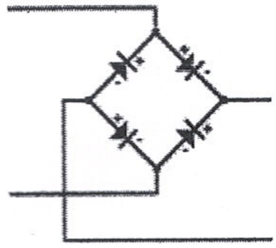
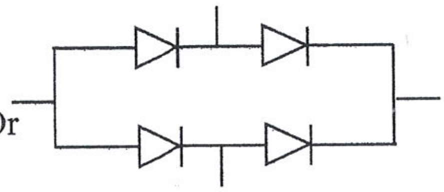
(iii) Illustrate graphically how the 12 V alternating voltage supplied by the transformer varies with time.

(iv) Draw using standard symbols, how the four diodes are connected in the full-wave rectifier circuit.

(v) Name the device indicated by X.

(20 marks)

(9)	(A)	(i)		Cell U / Electro chemical cell / Correct diagram	0
		(ii)		Oxidation	0
		(iii)		Zn (s) **(01)** ----------→ $Zn^{2+}_{(aq)} + 2e$ **(01)** or $Zn(s) - 2e$ ----------→ $Zn^{2+}_{(aq)}$ (01 mark for this equation) Physical states is not necessary.	0
		(iv)		The electrode connected to the positive terminal of the external electrical supply (battery) is the anode **(01)** whereas the electrode connected to the negative terminal is the cathode **(01)**	0
		(v)	(a)	Intensity of blue color decreases / blue color becomes colorless **(01)**	0
			(b)	As Cu^{2+} ions **(01)** responsible for the blue colour of the solution are removed / reduced **(01)**	
		(vi)		Zinc	0
	(B)	(i)	(a)	Step down transformer **(01)**	0
			(b)	Secondary coil **(01)** To avoid the heating / reduce resistance **(01)**	
		(ii)		$\frac{Vp}{Vs} = \frac{Np}{Ns}$ or $\frac{240}{12} = \frac{1800}{Ns}$ Or $Ns = \frac{1800 \times 12}{240}$ **(01)** $= 90$ **(01)**	0
		(iii)		 01 mark for naming axis and 01 mark for the shape of the graph	0

		(iv)		 Or  	**02**
		(v)		Capacitor (Smoothing capacitor / Electrolytic Capacitor)	**01**
				Total Marks	**20**