New Syllabus / மட புதிய பாடத்திட்டம்/New Syllabus

NEW

| 34 | E | II |

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2017 දෙසැම්බර්
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2017 டிசெம்பர்
General Certificate of Education (Ord. Level) Examination, December 2017

| විද්‍යාව | II | | පැය තුනයි |
| விஞ்ஞானம் | II | | மூன்று மணித்தியாலம் |
| **Science** | **II** | | ***Three hours*** |

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. The graph given here has been drawn considering several diseases, according to the data gathered from a census carried out recently in Sri Lanka on people who suffered from diseases.
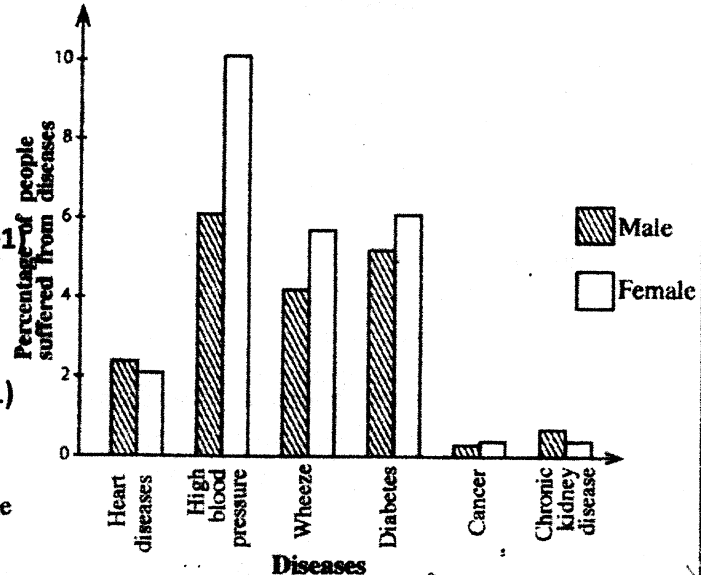
    (i) What is the category that all diseases stated in the graph generally belong to?
    non-communicable diseases /
    ..non infectious diseases..................(01)
    non - contagious

    (ii) Among the diseases given in the graph, from which disease do the most number of people suffer?
    High blood pressure   (01)
    if .... order no marks

    (iii) According to the graph, which diseases are males more susceptible in comparison to the females?

    • **Heart diseases**   (01)   • **Chronic kidney disease** (01) *(CKD no marks)*
    1st two marks

    (iv) (a) From the diseases given in the graph, name a disease which has a high tendency to affect the humans by persistent organic pollutants. ......**Cancer/ Wheeze/ Chronic kidney disease**   (01)

    (b) Write two special features of persistent organic pollutants.
    • **Persist in the environment for a long time period** • **Highly toxic** • **Accumulate in the body of organisms along food chains/ Getting subjected to bio accumulation / Getting subjected to bio magnification** • **spread widely in the environment**
    concentrate along the food chains
    (Two marks for any two ideas from above) (02)

    (v) State a fact related to agriculture that is considered as a reason for the chronic kidney disease.
    Using pesticides/ insecticides/ weedicides/ Chemical fertilizers / Agro chemicals or Entering heavy metals/ Arsenic/ Lead/ Cadmium/ mercury to the body.
    Answer with any above ideas   (01)

    (vi) One step that Sri Lanka has taken at present to control people getting subjected to certain diseases is given below.

    Introducing a colour code for soft drinks to indicate their sugar content.

    Which disease given in the graph is likely to be reduced to a great extent in the coming years due to the above action?

    • **Diabetes**   (01)

(vii) Write **two** bad habits that contribute for getting subjected to cancer.
   • Smoking / Chewing betel/ Using tobacco/ Using junk food/ Using alcohol/ Not following   relevant protective methods (in various instances) / Burning garbage/ Using artificial cosmetics/ Using drugs   02 marks for any 2 acceptable reasons (02)
   Exposure to radiations

(viii) Many diseases can be prevented by keeping the environment clean. Some items found in school environment which may cause environmental pollution are given below.

> Broken test tubes,   Plastic bottles,   Batteries, Pen tubes,
> Fluorescent bulbs,   Envelopes,   Filter papers

Classify the above items into **four** categories based on appropriate criteria, to make the waste management convenient for their disposal.

   Naming any 4 groups or classifying in to any 4 groups   (04)

   when the question is attempted,   give 02 marks

2. (A) Based on the structural features, vertebrates are classified into five groups. Consider the following table prepared in relation to it.

Vertebrate group	Pisces	A	B	Aves	C
Examples	Sea horse Skate	Toad Salamander	Tortoise Cobra	Jungle fowl Parrot	Bat Whale

(i) Name the vertebrate groups **A, B** and **C**.

   A : **Amphibians/Amphibia (01)** B : **Reptiles/ reptilia (01)**   C : **Mammals/ Mammalia (01)**

(ii) Name **two** cold blooded animals mentioned in the table.
   Give 02 marks if the answer is mentioned or not   (02)

Free ✳ ✳

(iii) To which vertebrate group stated in the table do the humans belong? ....
                                                              mammalia/ mammals/C
   (01)

(iv) Write **two** specific features related to flying, that belongs to vertebrates in Aves group.
   • **Having a very light endoskeleton**
   • **Streamlined body shape**
   • **Forelimbs are modified to wings/ having wings** **02 marks for any 2 features (02)**
   Air cavities within bones

(B) You are assigned to show experimentally, that oxygen gas is produced during photosynthesis.

(i) You are provided with the equipment and materials given below for the apparatus set-up relevant to the experiment. Draw a rough sketch of the set-up that you make using the given equipment.

> A beaker.   A boiling tube,   A glass funnel,   A hydrilla plant,   Water
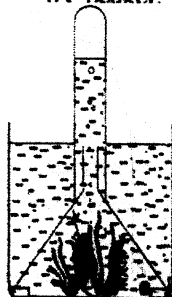
   • **Covering the plant by the funnel and the tube such that gas collected   or**
     Covered the plant by the tube only   (02)
   • **Presence of water   (01)**
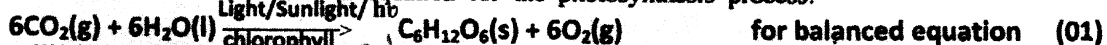   *without plants no marks*

(ii) Write an observation that can be made when the set-up is exposed to sunlight.
• **air/ gas bubbles are emitted (by the plant hydrilla) / decreasing the water level of boiling tube/ collecting a gas at the top of the boiling tube** .... **one mark for any one of them (01)**

(iii) How would you confirm that the gas produced during this experiment is oxygen?
• **Brighten the glowing splinter when inserted the tube (after removing water from the tube)/ the splinter will burn with a bright flame** ....*rakindle*........... **(give marks for an observation equal to this) (01)**

(iv) Write the balanced chemical equation for the photosynthesis process.

   $$6CO_2(g) + 6H_2O(l) \xrightarrow{Light/Sunlight/hv \atop chlorophyll} C_6H_{12}O_6(s) + 6O_2(g)$$ **for balanced equation   (01)**
   Solar power **mentioning light/ sunlight/ hv and chlorophyll (01)**
   not necessary to mention physical states

3. (A) All the elements belonging to the second period of the periodic table are given below without following the correct order.

| B | Li | C | Be | Ne | F | O | N |

(i) Arrange all the above elements as in the periodic table.

Li , Be, B, C, N, O, F, Ne   (02)

Give 01 mark if any 4 elements are shown in their correct positions

(ii) Write the electronic configuration of F.

2, 7   (01)

(iii) (a) Write the chemical formula of the compound which is formed in the reaction between Li and O.

Li_2O   (02)

(b) What is the type of chemical bond present in the compound stated in (a) above?

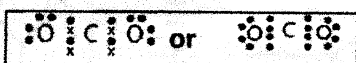**Ionic bonds**   / electro valent bond.   (01)

(iv) In the given box, draw the **Lewis structure** of CO_2 molecule which is formed with the combination of one C atom and two O atoms.

$$:\ddot{O}=C=\ddot{O}:$$ (02)
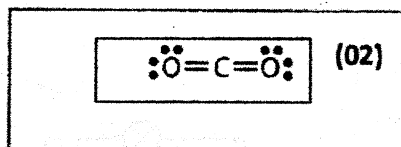
drawing $:\ddot{O}\overset{\times}{\underset{\times}{:}}C\overset{\times}{\underset{\times}{:}}\ddot{O}:$ or $:\overset{\times}{\underset{\times}{O}}:C:\overset{\times}{\underset{\times}{O}}:$ **give 01 mark**

(v) Diamond and graphite are main allotropic forms of C. Which of these allotropic forms conduct electricity?

Graphite   (01)

(vi) From the elements in this period, write respectively, the element which has the lowest first ionization energy and the element which has the highest electronegativity.

Li , F / Lithium, Fluorine   without Li, F there no marks (02)
for Li only — 01 mark

(B) The following questions are based on an experiment on producing a sample of oxygen gas in the laboratory.

(i) Among the compounds given below, which compound can be used to produce oxygen gas?

$CaCO_3$, $KMnO_4$, $MgSO_4$: **$KMnO_4$**   Potassium Per, no mark (01)

(ii) What is the type of reaction that takes place during the production of oxygen gas when only the compound you stated above is used?

decomposition (reactions)/ Chemical decomposition (reactions)   (01)
dessociation — no marks

(iii) Which equipment must be used to place the compound to carry out the experiment?

Boiling tube / test tube   (01)

(iv) What is the name given to the method that is used in the laboratory, to collect oxygen gas produced in this experiment?

downward displacement of water   (01)

(15)

4. (A) The figure shows a ray diagram relevant to a situation in which a fish in a pond is viewed by a kingfisher.

(i) Name the angles *i* and *r* shown in the ray diagram.

i - **angle of incidence** incident angle   (01)

r - **angle of refraction**   (01)   (02)

(ii) Considering the two media in the figure, state what is given by the constant $\frac{\sin i}{\sin r}$.

refractive index of air relative to water / w^na / $w^{\mu}a$ (01)
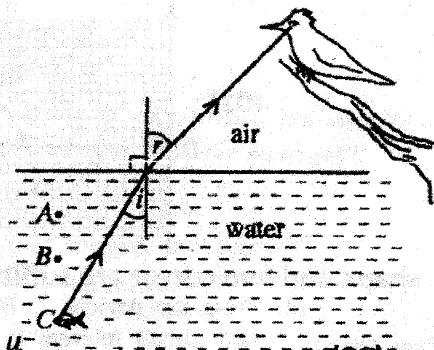only refractive index — no marks.

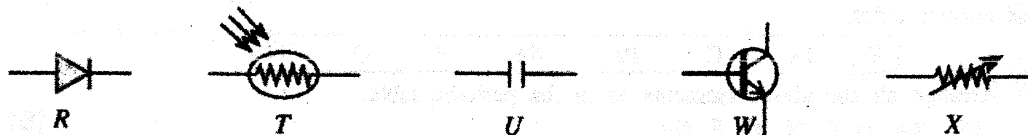(iii) Of the three positions *A*, *B* and *C*, at what position does the fish appear to the kingfisher?
**B**   (01)

(B) The standard symbols for some devices used in circuits are given below, labelled as R, T, U, W and X.

R T U W X

(i) Name the devices relevant to T, W and X.

T : **Light dependent resistor / LDR**   **(01)**

W : **Transistor (npn)**   **(01)**

X : **Variable resistor / Rheostat/ Volume controller**   **(01)**

(ii) Four circuits constructed in the laboratory are given below as ①, ②, ③ and ④ with standard symbols. Cells of 1.5 V, Bulbs of 2.5 V, identical diodes and switches have been used in the circuits.

①   ②   ③   ④
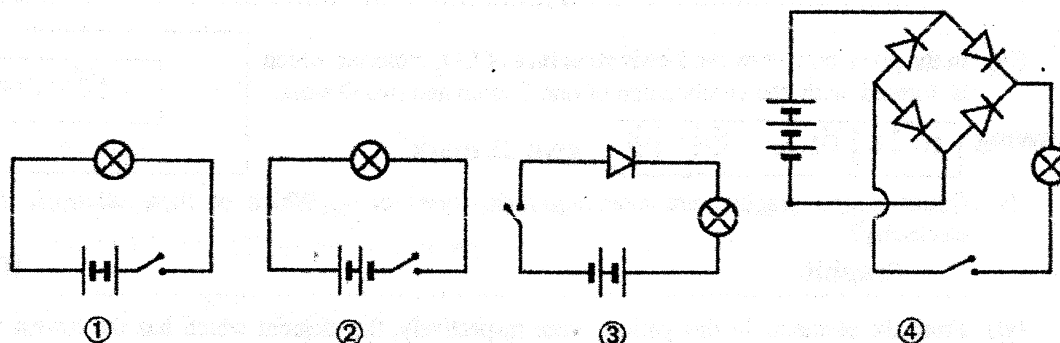
(a) State in the table below, whether the bulb lights up or does not light up when the switches in the circuits are closed,

Circuit	Bulb lights up / Bulb does not light up	
①	**does not light up**	**(01)**
②	**lights up**	**(01)**
③	**does not light up**	**(01)**
④	**lights up**	**(01)**

(04)

(b) Write down, relating to potential difference, the conclusion that can be reached through your observations in ① and ② in (a) above.

A potential difference is not supplied to flow a current to light up the bulb in the circuit. ①/ Potential difference is Zero. (01)/Bulb in the circuit ② lights up due to the flow of current as potential difference is supplied.(01)/ It is necessary to have a potential difference for the flow of current (02)

(c) Removing the battery in the circuit ④ above and instead, an alternating voltage of suitable value is connected and the switch is closed. The wave pattern relevant to the input in this circuit is given in figure (a). Draw the corresponding output wave pattern in figure (b).
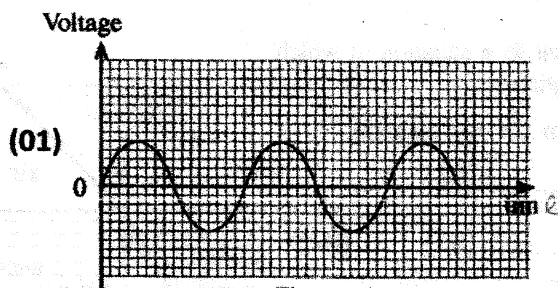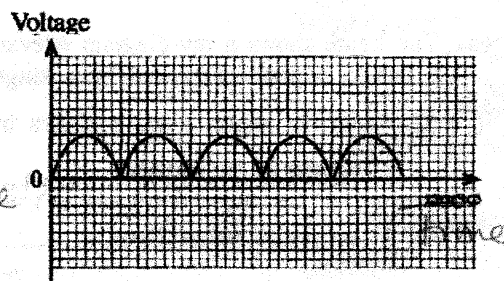

(01)

Figure (a)   Figure (b)

shape and two curves are sufficient (01)

(d) From the devices T, U, W and X, which can be used to smoothen the output current in the new circuit relevant to (c) above?

U / Capacitor / condenser   **(01)**

* *

15

Part B

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

5. (A) Some components in the human blood are given below.

  * Red blood cells
  * White blood cells
  * Platelets
  * Proteins
  * Glucose
  * Ca^{2+}
  * Urea

  (i) Which blood cells are most abundant in blood?

  (ii) Of the components given above,

  (a) write **two** components that belong to blood plasma.

  (b) state a nitrogenous waste material present in blood.

  (iii) (a) Given below is a diagram of a blood cell that belongs to a certain type. To which component given above, does this cell belong?

  (b) State a function of the blood component to which the cell given in (a) above belongs.

  (iv) (a) Write a disease associated with blood circulatory system of the human.

  (b) In a person suffering from Dengue, which component decreases drastically?

  (v) Briefly explain, the process of regulation of blood glucose level in human.

(B) (i) Steps of a plant grafting method are shown in the figure given below.
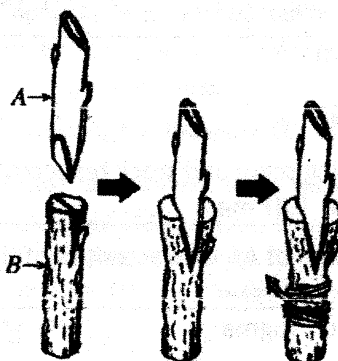
  (a) What is the name given to the above grafting method?
  (b) Write, respectively, the names given to parts A and B, according to this grafting method.
  (c) Of the parts A and B, characteristics of which part does the daughter plant get?

  (ii) Flower is the structure that contributes to sexual reproduction of plants.

  (a) Name the **three** parts that the gynoecium of a flower consists of.
 (b) Write **two** changes that take place in a flower after fertilization.

(*Total marks* 20)

⑤	(A)	(i)		Red blood cells / RBC *if two answers given – no marks*	01
		(ii)	(a)	Proteins/ glucose/ Ca^{2+}/ urea **one mark for one answer**	02
			(b)	Urea	01
		(iii)	(a)	White blood cells *(WBC/ Leucocytes — no marks)*	01
			(b)	Protecting the body from diseases/ Engulfing pathogens/ immunization/ producing antibodies / *engulfing/ germs* **any answer which gives any of the above ideas**	01
		(iv)	(a)	Artherosclerosis / hypotension / high blood pressure / hypertension/ Low blood Pressure / thrombosis/ coronary thrombosis/ heart attack *(heart diseases — no marks)*	01
			(b)	(blood) platelets	01
		(v)		**when the glucose level is increased,** Insulin is secreted (by the islets of langerhan) and then glucose is converted into glycogen. /Increase the *rate of* metabolic reactions **(01)**. Then blood glucose level is regulated. **when the glucose level is decreased,** Glucogon is secreted (by the islets of langerhan) and (deposited) glycogen is converted into glucose/ Decrease the rate of metabolic reactions **(01)**. Blood glucose level is regulated	02
	(B)	(i)	(a)	twig grafting / peg grafting / *wedge grafting* ✱	02
			(b)	A - scion (01) B - stock (01) or mentioning scion and stock respectively (02)/ if only scion has been written, give (01) mark	02
			(c)	Characteristics of A/ Characteritics of the scion	01
		(ii)	(a)	Ovary , Style , Stigma *(no order)* **(01) (01) (01)**	03
			(b)	• Ovary develops to form the fruit • sepals / petals, stamens and stigma are worn out • (Fertilized) ova *ovules* develop to seeds • wall of the ovary becomes the pericarp • wall of the ovule becomes the seed coat **one mark each for any fact with the above ideas**	02
				Total marks	**20**

6. (A) The structures **W**, **X**, **Y** and **Z** given below are the monomers of some polymers.

          W   **X**   **Y**   **Z**
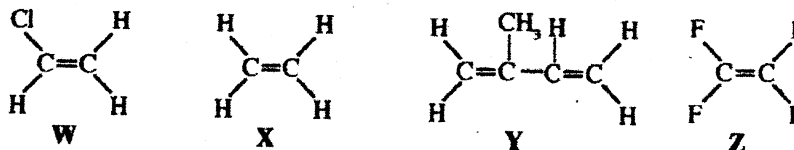
   (i) State a derivative of ethene from the monomers **W**, **X**, **Y** and **Z**.

   (ii) Name the polymers which are formed by the monomers **W**, **X** and **Y** respectively.

   (iii) What is the natural polymer among the polymers that you stated in (ii) above?

(B) In the following figures, two cells are given as *A* and *B*.
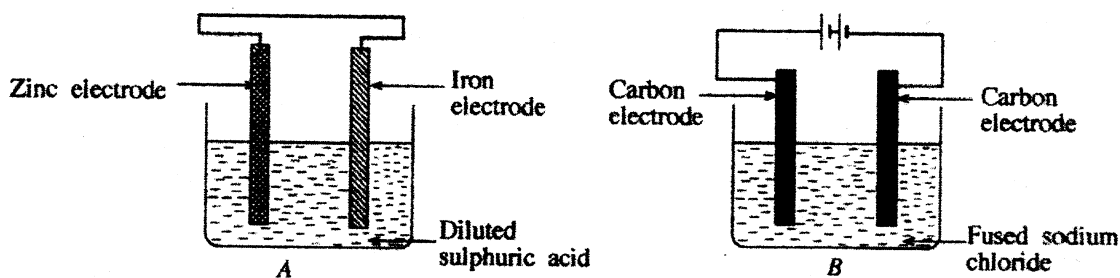
   (i) From the above two cells *A* and *B*, which is the electrolytic cell?

   (ii) Write **one** observation that could be obtained when the cell *A* operates.

   (iii) (a) Write the cathodic reaction that takes place in cell *B*.

        (b) What is the name commonly given to the electrodes where oxidation reaction takes place in both cells?

   (iv) What is the reason for **not** using cell *B* in the production of sodium metal, industrially?

(C) (i) Three instances relevant to separation of components from mixtures are given below.

      ① - Separation of various minerals from mineral sands
      ② - Separation of petroleum by the mineral oil refinery
      ③ - Obtaining distilled water from well water

      Write the separation methods used in the instances ①, ② and ③ above, respectively.

   (ii) Distilled water is commonly used as a solvent when preparing standard solutions in laboratory.

      (a) Calculate the mass of sodium chloride required to prepare a $100 \, cm^3$ of $1.00 \, mol \, dm^{-3}$ sodium chloride solution. (The molar mass of sodium chloride is $58.5 \, g \, mol^{-1}$.)

      (b) Write in order, the steps that are followed in the laboratory when preparing the sodium chloride solution mentioned in (a) above.

                                                     (*Total marks* 20)

|					
⑥	(A)	(i)		W/Z or chloroethene / tetrafluoroethene _correct structure of the molecule marks given_	01
		(ii)		W- polyvinyl chloride / polychloroethene / PVC (01) X - polythene / polyethene / polyehylene (01) Y - Rubber / natural rubber / polyisoprene (01)	03
		(iii)		Rubber / natural rubber / polyisoprene	01
	(B)	(i)		B	01
		(ii)		• liberation of gas bubbles at the iron electrode • Dissolving/ decaying / getting eroded the Zinc electrode • the cell is getting heated _for any observation_	01
✳		(iii)	(a)	$Na^+(\ell) + e \longrightarrow Na(S)$ (Physical state is not essential) Anode	02 01
			(b)	Anode	
		(iv)		NaCl could be formed by the reaction of Cl_2 gas produced at the anode and Na discharged at the cathode/ as Na is highly reactive/ Na and Cl_2 can react again	01
	(C)	(i)		① physical method/ mechanical separation/ any relevant physical method (like filtering and magnetic separation) ② fractional distillation ③ simple distillation	03
		(ii)	(a)	Mass of NaCl required to prepare a 1000 cm^3 solution of 1mol dm^{-3} = 58.5 g Mass of NaCl required to prepare a 1cm^3 solution of 1mol dm^{-3} = $\frac{58.5\ g}{1000}$ Mass of NaCl required to prepare a100cm^3 solution of 1mol dm^{-3} = $\frac{58.5}{1000}$ X 100 g (01) = 5.85 (g) (01) _Unit not required._ **Give marks for the calculation using n=cv**	02
			(b)	● measuring the mass (5.85 g) of NaCl (accurately using a triple beam balance) (01) ● putting measured NaCl completely into a volumetric flask (of 100 cm^3) (01) ● dissolving NaCl well by filling about the half of the flask with water. (01) ● adding / mixing by adding water upto the final voulme of 100 cm^3 (01)	04
				mixing after adding water. **Total marks**	20

7. It is necessary to be vigilant and obey road rules when using high ways.

(i) It is important for the driver as well as passengers to wear seat belts in the vehicle when travelling on high ways. What is the reason for this?

(ii) Write down the Newton's law of motion which is connected to the answer you mentioned in (i) above.

(iii) The displacement-time graph for the motion of the vehicle A, which travelled on an express way from the beginning to the end at the **maximum** permissible **velocity** is given here.

Here, it has been assumed that the express way is horizontal and it is in a straight line.

Answer the following questions using the graph.

(a) What is the length of the express way?

(b) Calculate the **maximum** permissible **velocity** that a vehicle can be driven in that express way.
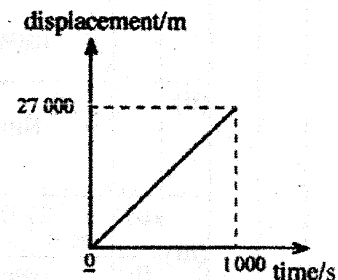
(iv) In heavy rainy days, the drivers are advised to maintain 15 m s^{-1} as the **maximum velocity** for a vehicle that is driven on the express way mentioned in (iii) above.

(a) What is the main reason for advising the drivers **not** to drive the vehicles at a higher velocity when heavy rain exists?

(b) Explain scientifically, your answer in (a) above.

(c) On a heavy rainy day, the motion of the vehicle B which travelled from the beginning to the end of the express way mentioned in (iii) above was as follows.

It started from the rest and uniformly accelerated in the first 10 seconds and acquired **maximum velocity** (15 m s^{-1}). Thereafter it travelled at the same velocity for a certain time and in the last 10 seconds it uniformly decelerated and came to rest at the end of the express way.

Including the given information, draw a rough sketch of the velocity-time graph for the motion of vehicle B.

(d) Find the total time taken by vehicle B to travel on the express way.

(e) If the mass of the vehicle B is 3 000 kg, Find its momentum at the instance when it travelled in the maximum velocity.

(v) When drivers are driving vehicles, it is important to pay attention to the side mirrors in front of the vehicles for the prevention of accidents.

(a) What type of curved mirrors are used as side mirrors of the vehicles?

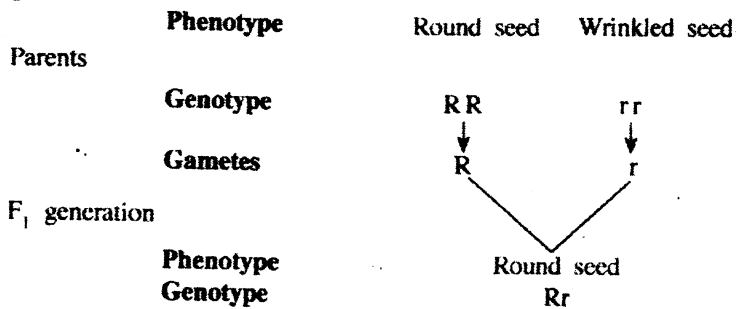(b) How does paying attention to those mirrors, contribute to prevent road accidents when the vehicles are driven?

(Total marks 20)

⑦	(i)		When the vehicle is moving , the driver and the passengers have the same velocity of the vehicle. Therefore to prevent the driver and the passengers moving forward upon applying brakes (the seat belts should be worn) any answer with the idea of preventing the driver and the passengers moving forward upon applying brakes.	01
	(ii)		Newton's first law / Newton's third law / writing the law with the ~~real meaning~~ *accurately*	02
	(iii)	(a)	27 000(m) / 27 km	01
		(b)	velocity = $\dfrac{\text{displacement}}{\text{time}}$ or = $\dfrac{27000(m)}{1000(s)}$ (01) = 27 (m s^{-1}) (01)	02
	(iv)	(a)	prevent the vehicle from slipping / prevent from accidents (01)	01
		(b)	The possibility of accidents is high due to reducing the friction (frictional force) between the tyres of the vehicle and the road when raining. **For any answer with the idea of reducing friction** *no friction ——— no marks .*	02
		(c)	velocity (m s^{-1}) 15 0 10 Time (s) *10 S* • lebelling the axes / Naming the axes as V and t **(01)** • shape of the graph **(01)** • marking the velocity 15 (m s^{-1}) and time 10 (s) **(01)** **Give one mark for drawing and labelling the two axes without drawing the graph**	03

			(d)	total distance travelled by the vehicle = area under the graph = area of the trapezium **or** $27000 = \frac{1}{2}(10 + t + 10 + t) \times 15$ **(01)** $t = 1790\,(s)$ **(01)** Total time $= 1790 + 20$ $= 1810\,(s)$ *If child has written a wrong answer for t = any how 20 added to that answer give* **(01)** *01 marks.*	**03**
			(e)	momentum = mass × velocity **or** momentum = mv **or** $= 3000\,(kg) \times 15\,(m\,s^{-1})$ **(01)** $= 45000\,(kg\,m\,s^{-1})$ **(01)**	**02**
(v)	**(a)**			convex mirror	**01**
	(b)			• Larger area behind the vehicle can be seen well • Larger area can be viewed through convex mirror at once • Always upright images can be seen • The image distance is smaller than the object distance **For any answer with a brief explanation**	**02**
				Total marks	**20**
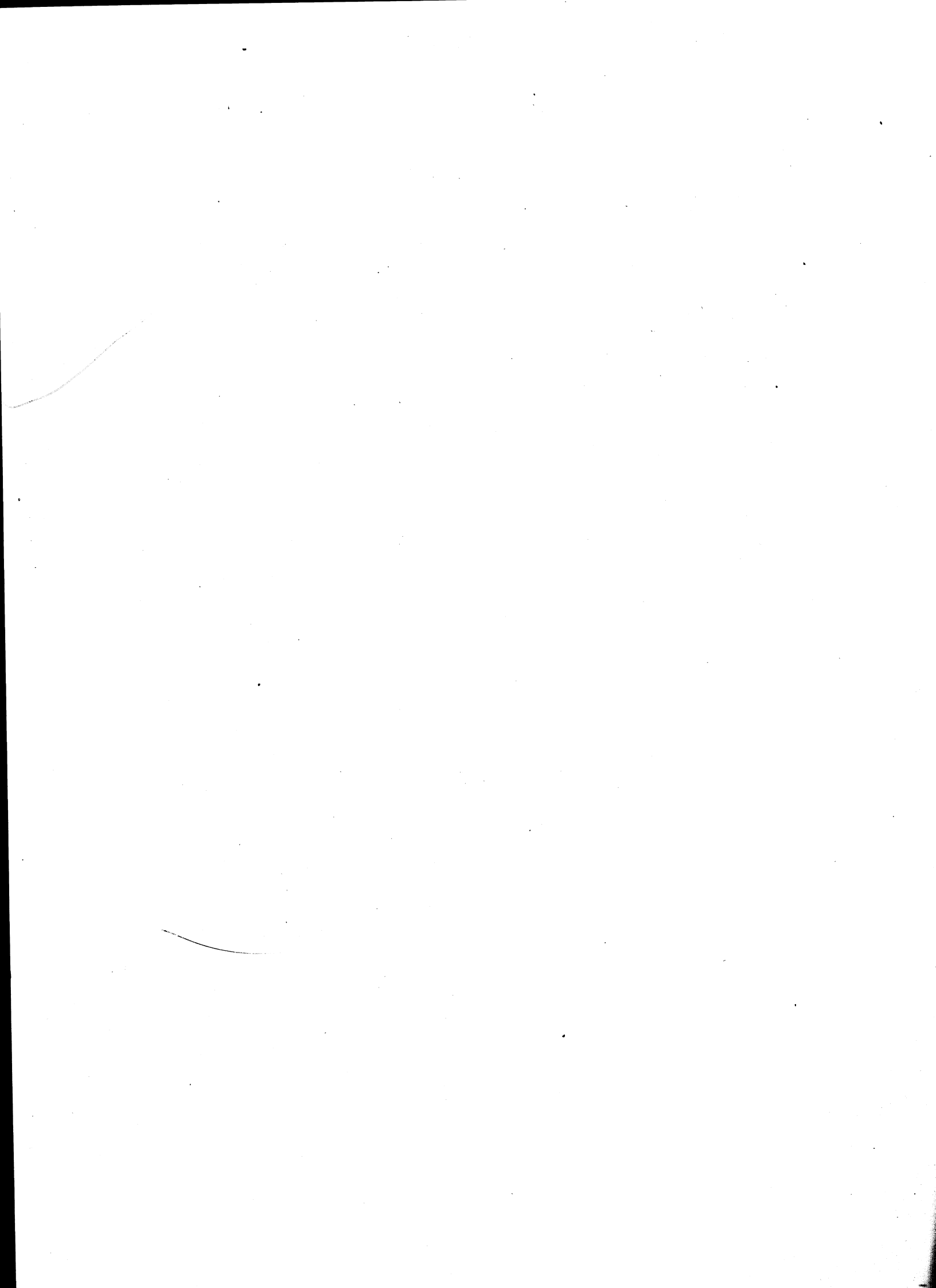
3. (A) A diagram relevant to the experiment carried out by Mendel on inheritance, using garden pea plant is given below.

| | **Phenotype** | Round seed | Wrinkled seed |

Parents

Genotype   R R   r r

Gametes   R   r

F_1 generation

Phenotype   Round seed
Genotype   Rr

(i) What are the contrasting characters used in this experiment?

(ii) In which step does meiosis occur during this process?

(iii) (a) According to the above experiment, show, using a diagram, how characters are inherited in a mono-hybrid cross of F_1 generation.

(b) Write the genotypes and corresponding phenotypes of the offsprings obtained in F_2 generation in the above cross.

(iv) Transmission of inherited characters to the next generation as stated above is common to all living organisms. Accordingly, explain briefly, the importance of not having marriages between blood relations.

(B) Several electric appliances used in a house are given below.

> Television, Fluorescent lamp, Microwave oven, Immersion heater, Hot plate, Electric iron

(i) When some appliances mentioned above are used, it is necessary to use three pin plugs.
(a) From these appliances, name one appliance with which a three pin plug must be used.
(b) What is the importance of using a three pin plug for the appliance you mentioned in (a) above?

(ii) Write down a main energy form that the electric energy converts into, when the television operates.

(iii) Television is operated by a remote control.
(a) As what type of waves are the signals sent to the television by the remote control?
(b) Write **two** characteristics of the wave type that you have mentioned in (a) above.

(iv) The power of some appliances mentioned above are given in the following table.

Appliance	Power/W
A - Television	125
B - Fluorescent lamp	18
C - Microwave oven	1500
D - Electric iron	1200

In a certain day all these **four** appliances were operated during 1 hour and 30 minutes period.

(a) Arrange A, B C and D in the ascending order of the electric energy consumption during the time of operation. (Calculations are not expected)

(b) Calculate the electric energy consumed by A during that time.

(*Total marks* 20)

⑧(A) (i)
- round seeds   (01)
- wrinkled seeds   (01)

02

(ii)

When forming the gametes

01

(iii)(a)

(F₁ genotype)   Rr   Rr   (01)

(gametes)   R   r   R   r   (01)

(F₂ generation)   (01)

RR   Rr   Rr   rr

round   round   round   wrinkled

or

Mentioning R, r (01)

(01)

Rr / Rr	R	r
R	RR	Rr
r	Rr	rr

(01)

03

(b)

round seeds   :   RR, Rr   (02)   or   :   RR - round seeds (01)

wrinkled seeds :   rr - (01)   Rr - round seeds (01)

                                              rr - wrinkled seeds (01)

If phenotypes are written in part (a), give marks relevant for part (b)

03

(iv)

- Hidden recessive genes/ characterists become prominent (due to the marriage of

  blood relations)   (01)

- so, there is more tendancy for hereditary diseases to become prominant (01)

02

(B) (i) (a)

- microwave oven

- hot plate

- immersion heater

- electric iron

for any answer

01

(b)

prevent from accidents due to leakage of electricity / for earthening a short circuit

current

01

	(ii)		• light (energy) • sound (energy) • heat (energy) • radiation (energy) for any answer	01
	(iii)	(a)	• Infra red rays/ IR rays / electromagnetic waves	01
		(b)	• Do not require a medium for propagation • Travel at a speed of $3 \times 10^8 \, m\,s^{-1}$ in vacuum • Not affected by external electric and magnetic fields • No charge • Type of transverse waves • invisible • Frequency is in the range 10^{12}Hz - 10^{14}Hz approximately / Wave lenght is in the range 10^{-6} m - 10^{-3} m approximately *no marks for electric and magnetic properties.* for any two from the above	02
	(iv)	(a)	B, A, D, C / B < A < D < C If the answer has been given with appliances, award marks	01
		(b)	$E = Pt$ or Consumed electric energy $= \dfrac{125}{1000} \times \dfrac{3}{2}$ (01) $= \dfrac{375}{2000}$ $= \dfrac{3}{16}$ kWh/0.19kWh (01)	$E = Pt$ or $E = 125 \times 1.5 \times 60 \times 60$ (01) $= 675000\,J$ or $= 675\,kJ$ (01)
			Total marks	20

9. (A) The three solutions NaOH, HCl and NaCl of concentration 1.00 mol dm^{-3} are put separately into t tubes **A, B** and **C**.

 (i) The tests carried out by a student to identify the solutions separately, and the observations ma are given in the table below.

	Test	Observations
1.	Dipped red and blue litmus papers in the solution in tube **A**	● Blue litmus did not show any colour chang● Red litmus turned to blue
2.	Dipped red and blue litmus papers in the solution in tube **B**	● Red and blue litmus did not show any colo change

Mention the solutions in test tubes **A, B** and **C** respectively.

 (ii) When 100 ml of each of the solutions NaOH and HCl stated above were mixed in a therma insulated vessel, the temperature of the mixture rose up to 5 °C.

 (a) Write the balanced chemical equation for the reaction between NaOH and HCl.

 (b) Calculate the heat change associated with the reaction mentioned above. (Take the specific h capacity of water as 4 200 J kg^{-1} °C^{-1} and the density of water as 1 g cm^{-3}).

 (iii) Write two assumptions that you made when determining the heat change associated with the reacti between NaOH and HCl stated above.

(B) The sun, atmosphere, land and the sea are natural resources.
 (i) The sun's surface temperature is approximately 5 800 K.

 (a) What is the surface temperature of sun in Celsius?

 (b) In which heat transferring method does the heat transfer from sun to earth?

 (c) Explain scientifically, how the sea breeze is formed in day time due to sun's heat.

 (ii) In a certain day, the atmospheric pressure at sea level was 76 cm Hg and the atmospheric press at 10 km above sea level was 20 cm Hg.

 (a) Name a laboratory instrument which is used to take the measurements of atmospheric press stated above.

 (b) What is the reason for the pressure difference observed above?

 (iii) Calculate the hydrostatic pressure at a place 2 km deep from the sea level. Take the density sea water as 1050 kg m^{-3} and acceleration due to gravity as 10 m s^{-2}.

(Total marks 2

⑨(A)	(i)		A - NaOH (01)
			
			 B - NaCl (01)
			
			 C - HCl (01) **or**
			
			                      NaOH, NaCl, HCl
			                      (01) **(01)** **(01)**
					03

	(ii)	(a)	$NaOH + HCl \longrightarrow NaCl + H_2O$		02
		(b)	$Q = mc\theta$ (01) $= \dfrac{200}{1000} \times 4200 \times 5$ (01) $= 4200\,J$ **or** $4.2\,kJ$ **or** heat change $= -\,4200\,J$ **or** $-\,4.2\,kJ$ (01)		03
	(iii)		*no any heat release — no marks* • No any heat loss / the whole amount of heat produced is used to increase the temperature of the solution • the specific heat capacity of the solution is equal to the specific heat capacity of water • Density of the solution is equal to the density of water **any 2 from above**		02
(B)	(i)	(a)	$(5800 - 273) = 5527\,(^{0}C)$ **or** $(5800 - 273.15) = 5526.85\,(^{0}C)$		01
		(b)	by radiation		01
		(c)	During the day time, the land surface get heated more relative to the sea (01). Then air near the land surface warms up and move upwards (01). Threrfore (the air pressure closer to the land is low) an air current flows from the sea to the land (01).		03
	(ii)	(a)	barometer / aneroid barometer / mercury barometer		01
		(b)	*Column* The height of the air layer that is 10 km above the sea level is lesser than the air layer closer to the sea level/ The pressure get decresed when the height of the air layer decreases / The pressure get decreased when going up from the sea level as the height of the air column decreases. *The pressure get decreased when going up from the sea level as the density of air decreases.*		01

	(iii)		
		$\text{pressure} = h\rho g$ (01) $= 2 \times 1000\,(m) \times 1050\,(kg\,m^{-3}) \times 10\,(m\,s^{-2})$ (01) $= 1050 \times 20 \times 1000$ $= 21000000\,(Pa)$ **or** $= 21 \times 10^6\,(Pa)$ (01)	
			03
		Total marks	20