නව නිර්දේශය/புதிய பாடத்திட்டம்/New Syllabus

NEW

இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

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கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2016 டிசெம்பர்
General Certificate of Education (Ord. Level) Examination, December 2016

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விஞ்ஞானம்	II
Science	II

පැය තුනයි
மூன்று மணித்தியாலம்
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. Ozone layer depletion, global warming, eutrophication, biomagnification and acid rains are a few direct effects of environmental pollution.

(i) What is meant by biomagnification?

.....

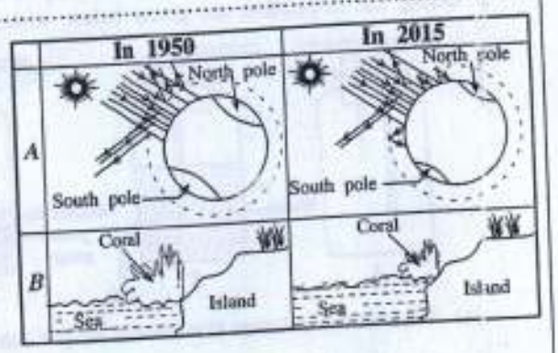
(ii) What is the function of the ozone layer?

.....

(iii) During the past century, the sea level has risen by about 10-20 cm. Which of the above effects was directly responsible for this?

.....

(iv) Consider the figures *A* and *B*. (These are rough diagrams.)



(a) State which of the above **two** effects are shown by *A* and *B*.

A: .....

B: .....

(b) State **two** gases responsible for *B* and state **one** method for each that releases each of these gases. (Write the relevant method in front of the name of the gas.)

.....

.....

(v) Some solid waste material responsible for environmental pollution are as follows.

Fluorescent lamps, polythene, chemical fertilizers, detergents, animal excreta matters

(a) Of the above, state a material which causes eutrophication.

.....

(b) From which of the above materials, mercury could mostly be released to the environment?

.....

[See page two

(c) For which of the 4R waste handling techniques can each of the following activities be considered as an example?

I. Use of organic fertilizer instead or chemical fertilizer: .....

II. Production of biogas using animal excretory matter: .....

(vi) Write down **two** renewable energy resources which are eco-friendly.

.....

15

2. (A) Invertebrates are separated into phyla based on their features.

(i) In the second column of the table given below, state the phylum which has each of the features indicated as *a*, *b*, *c* and *d* in the first column.

Feature	Phylum
a - Multicellular body build up of two germinal layers	
b - Presence of a muscular foot	
c - Living only in marine habitats	
d - Presence of a chitinous cuticle	

(ii) Name an animal that possesses the feature (a) given in the above table. .....

(iii) Write down the kingdom and domain to which the phyla stated in (i) above belong.

Kingdom: ..... Domain: .....

(B) Respiration is a process of living organisms.

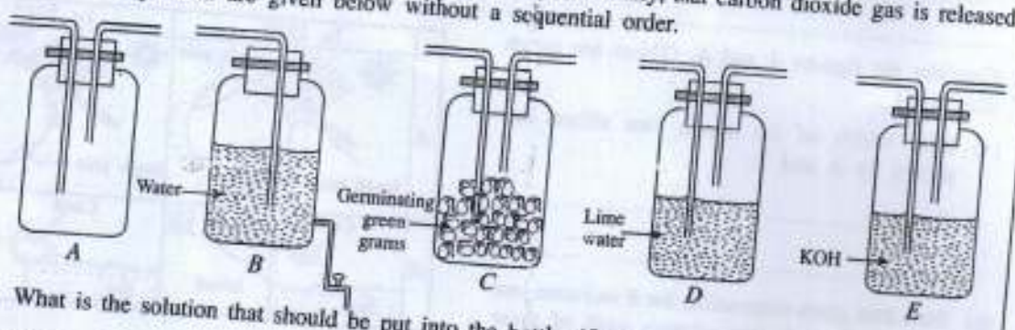
(i) (a) State the **two** types of respiration that can takes place in organisms.

.....

(b) Which one of the two types of respirations stated in (a) above produces more energy?

.....

(ii) The apparatus needed to arrange a set-up to show experimentally, that carbon dioxide gas is released during the respiration are given below without a sequential order.



(a) What is the solution that should be put into the bottle *A*? .....

(b) After putting the relevant solution into the bottle *A*, write down the correct sequence in which the above bottles (*A*, *B*, *C*, *D* and *E*) should be connected. .....

(c) State what should be done after connecting all the bottles correctly.

.....

(d) After the step mentioned in (c) above, state the change that could be observed in the set-up.

.....

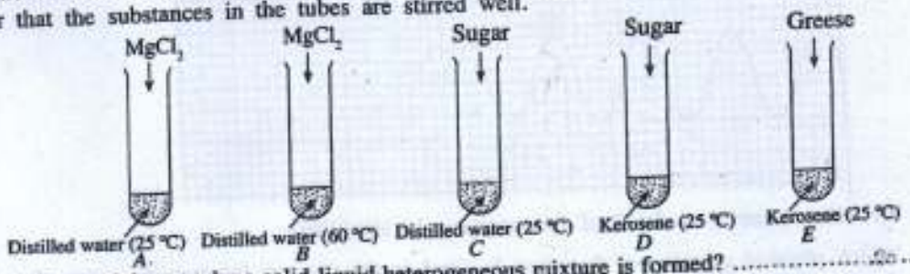
(e) State the change that should be done to the above set-up to arrange a control set-up relevant to the above experiment.

.....

15

[See page three

3. As shown in the following figures, $MgCl_2$, sugar and grease are added to the test tubes *A*, *B*, *C*, *D* and *E*. After that the substances in the tubes are stirred well.



(i) (a) In which test tube a solid-liquid heterogeneous mixture is formed? .....

(b) Write respectively, the solute and the solvent in this mixture.

.....

(ii) (a) Define 'solubility of a solute'.

.....

.....

(b) What factor that affects the solubility can be shown by each of the following pairs of test tubes?

I. *A* and *B*: .....

II. *C* and *D*: .....

III. *D* and *E*: .....

(iii) In the above experiment, 1.9 g of $MgCl_2$ was added to the tube *A* and the total volume of the solution formed was 10 cm^3.

(a) Find the number of moles of $MgCl_2$ added. (Mg = 24, Cl = 35.5)

.....

.....

(b) Calculate the concentration of $MgCl_2$ in the solution.

.....

.....

(iv) Water is a good solvent. Write **two** special properties possessed by water due to the intermolecular forces.

.....

.....

15

4. Consider the following types of waves.

- Ultraviolet rays
- Infra-red rays
- Micro waves
- X-rays
- Gamma rays
- Visible light
- Sound waves
- Ultrasound waves

(i) Of the above waves, mention a wave that propagates with compressions and rarefaction.

.....

(ii) Write down a special characteristic of ultrasound waves.

.....

(iii) In the field of medicine, which type of the above waves is generally used to observe the conditions of the fetus inside the womb of a pregnant mother? .....

(iv) A part of the electromagnetic spectrum is given below.

A	*B*	Visible Light	Ultraviolet rays	*C*	Gamma rays

(a) Considering the sequence of above waves, write down the types of waves that should be in the places *A*, *B* and *C*.

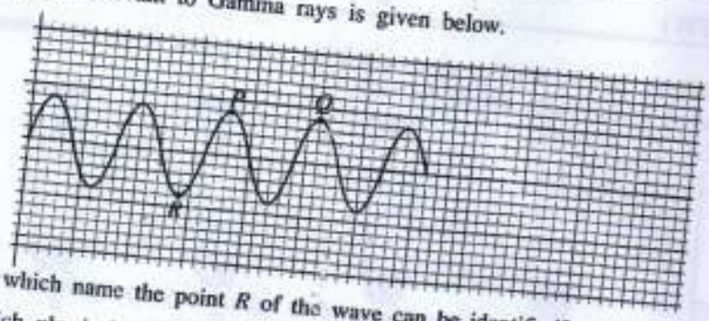
A: .....

B: .....

C: .....

[See page four

(b) A waveform relevant to Gamma rays is given below.

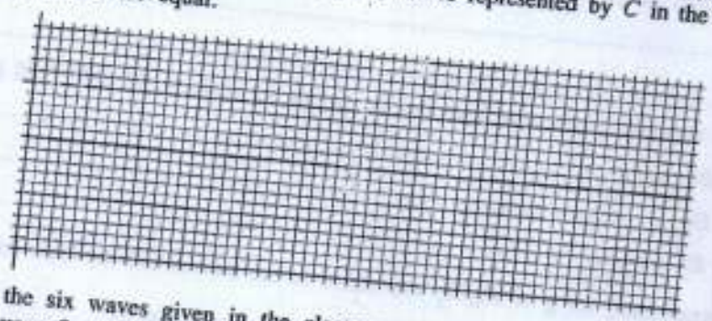


I. By which name the point R of the wave can be identified? .....

II. Which physical quantity of the wave is equal to the distance between the points P and Q of the wave?

.....

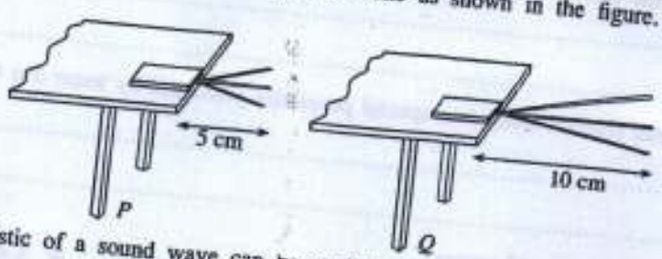
III. Considering the features of the waveform given above for Gamma rays, draw a typical waveform in the following grid, for the type of waves represented by C in the spectrum above when the amplitudes are equal.



IV. Of the six waves given in the electromagnetic spectrum above, which wave has the highest frequency?

.....

(v) A diagram depicting two instances P and Q of an activity done in the laboratory to study a certain characteristic of sound waves is given below. A hacksaw blade is kept on the table and a heavy metal block is kept on the blade when this activity was done as shown in the figure. Then the blade was vibrated.



(a) Which characteristic of a sound wave can be studied from this activity?

.....

(b) On which physical quantity does the characteristic you mentioned (a) above depend?

.....

(c) What conclusion can be arrived at through this activity?

.....

(vi) How does the speed of sound in air vary with the temperature?

.....

* *

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[See page five

Part B

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

5. (*A*) Average masses of macronutrients present in a biscuit of a particular brand are given in the following table.

Macronutrient	Mass
Proteins	0.81 g
Carbohydrates	5.67 g
Fat	1.55 g

(i) What are the elements present in proteins?

(ii) (a) When a person consumes a biscuit of the above brand, in which part of the digestive system does its digestion start?

(b) Name the enzyme that is added to food in the part stated in (a) above, and state the nutrient on which that enzyme acts.

(c) State the **two** substances that are mainly added to this food in the stomach.

(d) In which part of the digestive system is the digestion of this food completed?

(e) State the end products of this digestive process.

(f) Write one adaptation of the human digestive system for efficient absorption of end products of digestive process.

(*B*) Reproduction is the process of production of a new generation from one generation.

(i) State respectively, the names given to male and female gametes that contribute to human reproductive process.

(ii) In a human somatic cell, how many pairs of sex chromosomes are present?

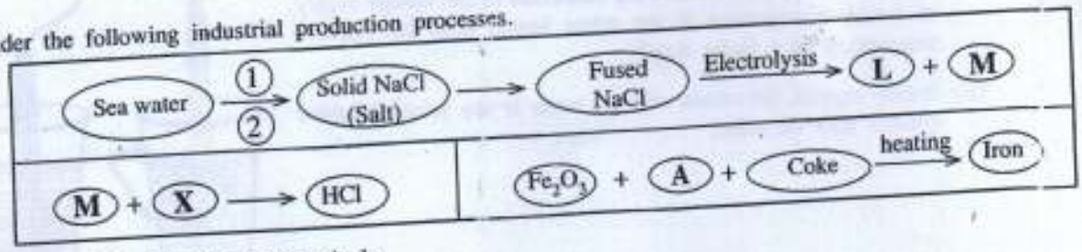
(iii) Considering the sex chromosomes, show, using a diagram, how sex is determined in humans.

(iv) (a) What is the sex-linked disorder that occurs only in males?

(b) What is the genetic reason for this disorder?

(Total marks 20)

6. Consider the following industrial production processes.



(i) Name **A**, **L**, **M** and **X** respectively.

(ii) Write a physical property of **X**.

(iii) Write down the **two** separating techniques (1) and (2) relevant to production of salt from sea water.

(iv) About 40% $CaCl_2$ is added to NaCl when obtaining fused NaCl from solid NaCl. What is the reason for that?

(v) What is the strategy used in the cell to prevent the reaction between **L** and **M** produced by the electrolysis process?

(vi) (a) Is the chemical reaction occur in **A** in the process of iron extraction, exothermic or endothermic?

(b) Draw the energy level diagram for this reaction and state reactants and products.

(vii) (a) Write the balanced chemical equation relevant to the production of iron from Fe_2O_3.

(b) In this process 1680 kg of pure molten iron was obtained from a 2520 kg of mixture of Fe_2O_3 with impurities. (In this case, assume that all Fe_2O_3 reacted completely.)

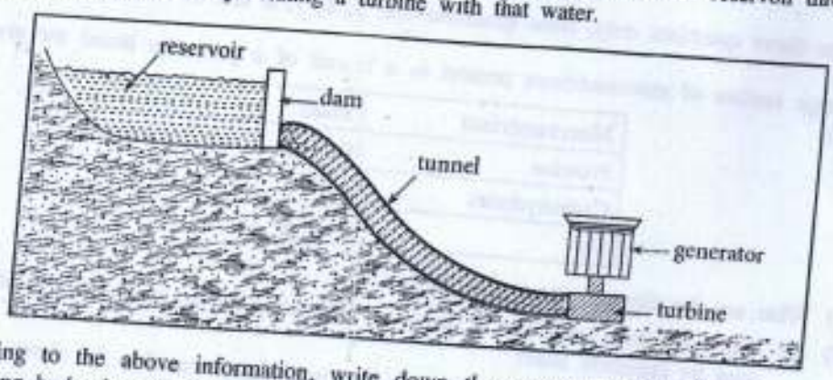
I. Find the number of moles of molten iron obtained and calculate the mass of Fe_2O_3 reacted. (Fe = 56, O = 16)

II. What is the mass of impurities presented in the mixture?

(Total marks 20)

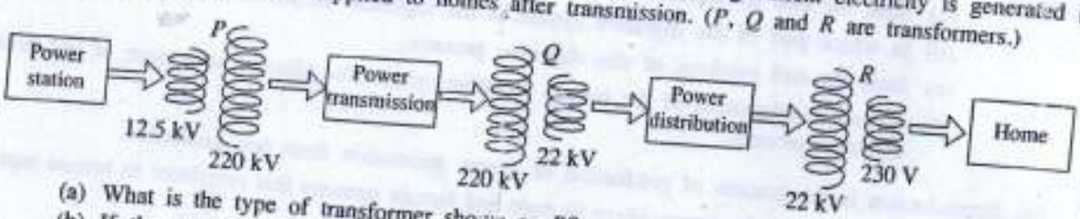
[See page six

7. (A) Consider the following figure pertaining to a hydro-power plant. As shown in the figure, the water is brought from a place in the reservoir to the power plant located below the reservoir through a tunnel. Electric power is generated by rotating a turbine with that water.



(i) According to the above information, write down the energy transformation that takes place in generating hydroelectric power.

(ii) The following diagram shows the way in which the alternating current electricity is generated in the power station and supplied to homes after transmission. (*P*, *Q* and *R* are transformers.)



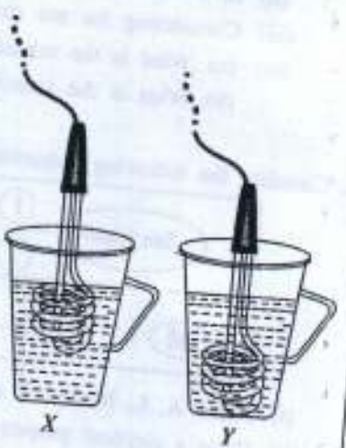
(a) What is the type of transformer shown as *P*?

(b) If the number of turns in the primary coil of *R* is 8 800, find the number of turns in its secondary coil.

(B) Two similar arrangements, *X* and *Y* which have been used in a house to heat water using the voltage of 230 V are given below. However in *Y*, the immersion coil is immersed to a greater depth.

(i) When the immersion heaters are connected to the voltage supply, in which arrangement is the water heated upto the required temperature in a lesser time?

(ii) Briefly explain, the reason why the water in one vessel is heated quicker than the other.



(iii) 1.5 kg of water in 27 °C is put into the vessel in the arrangement which heats up water in a quicker time and the immersion heater is connected to the voltage supply.

(a) If the water was heated upto 97 °C, find the amount of heat absorbed by water. (Take the specific heat capacity of water as 4 200 J kg^{-1} K^{-1})

(b) The power of the heater is 1 kW. If the time taken to heat the water upto 97 °C was 8 minutes, calculate the energy consumed by the immersion heater during that time.

(c) In that house, water is heated 4 times per day as above. Find the number of units of electricity they have consumed in a month of 30 days.

(C) There is a greater attention at present to generate electricity using solar cells.

(i) What is the basic electronic component which is used to construct a solar cell?

(ii) What will happen when the sun light is incident on that component?

(iii) What type of an arrangement is known as a solar panel?

(iv) Write down an advantage of using solar cells to generate electricity.

(Total marks 20)

[See page seven

8. (A) Some main endocrine glands in the human body are given below.

Pituitary, Thyroid, Pancreas, Adrenal glands, Gonads

(i) Which of the above glands is located below the hypothalamus?

(ii) Write down, in correct sequence, the glands that secrete calcitonin and oestrogen and state the main function of each hormone in correct sequence.

(iii) (a) What is the gland that secretes the hormone which converts glucose to glycogen?

(b) In which organ of body, glycogen is mainly stored?

(c) What is the disease condition that occurs due to non-secretion of the hormone stated in (a) above?

(iv) Write **two** features of the hormones secreted by the glands stated above.

(B) Following diagrams show some play items in a children park.

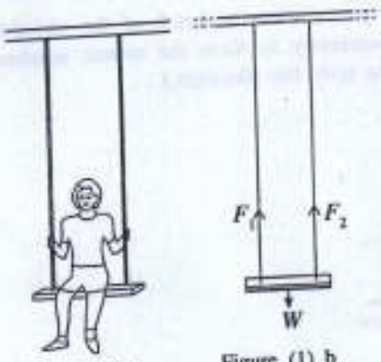


Figure (1) a

Figure (1) b

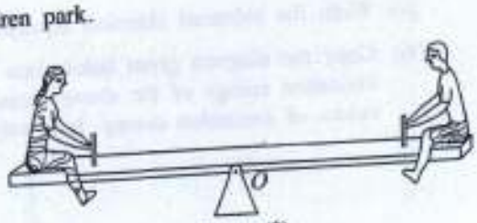


Figure (2)

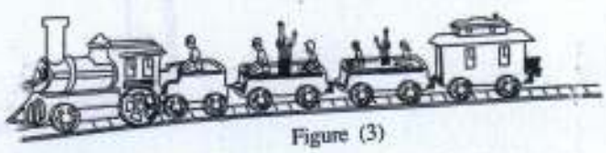


Figure (3)

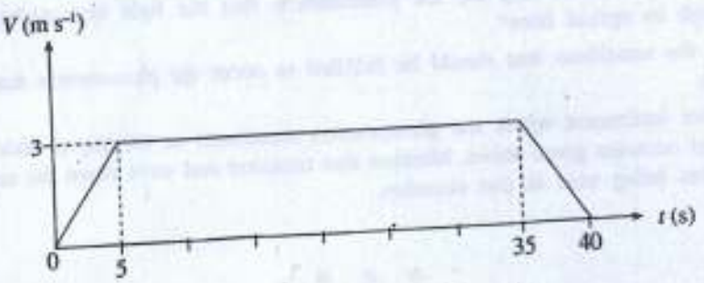
(i) As shown in the figure (1) a, a child is sitting in equilibrium and stationary in a swing. Figure (1) b shows the corresponding force diagram for this situation. Write a relationship among F_1, F_2 and W. Here, F_1 and F_2 are the forces exerted by ropes, and W is the weight of the child and the seat.

(ii) In figure (2), the mass of each child who is sitting on the two sides of the see-saw is 25 kg.

(a) What can be said about the resultant of the system of forces acting on the see-saw?

(b) The distance from the rotating point O to the place where each child is sitting is 1.5 m. Find the moment of the couple of forces acting there.

(iii) Figure (3) shows a play train in the park that moves in a straight line path. The velocity-time ($V - t$) graph for its motion from the starting point to the ending point is given below.



(a) Briefly explain the nature of the motion of the play-train.

(b) The total mass of the train with the children is 1500 kg. Find the momentum of the train in the time duration from 5 seconds to 35 seconds.

(c) If the length of the play-train is 18 m, calculate the length of the railway.

(Total marks 20)

[See page eight

9. (A) **A**, **E**, **G**, **J**, **L**, **M**, **Q** and **R** are 8 consecutive elements in the periodic table. The atomic number of all these elements are less than 20. **E** naturally occurs in allotropic forms and one of the forms conducts electricity. (Here, the given symbols are **not** the standard symbols of the elements.)

(i) What is the element **E**?

(ii) Of the above elements,

(a) which element occurs as a noble gas at room temperature?

(b) which element has the highest electro negativity?

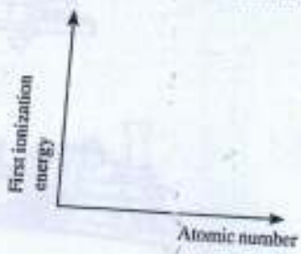
(c) which element is at the top most level of the activity series?

(iii) Draw the Lewis dot diagram of a molecule formed by the element **G** with Hydrogen.

(iv) Of the above elements, which element is most suitable to produce a sample of H_2 gas in the laboratory?

(v) Write the balanced chemical equation for the reaction of **R** with steam.

(vi) Copy the diagram given below into your answer script and draw a sketch of the variation of first ionization energy of the above elements. (It is **not** necessary to show the atomic number and the values of ionization energy. It is sufficient to mention only the elements.)



(B) In the following occasions ①, ②, ③ and ④, optical items/instruments were used.

① – A dentist examining teeth in a mouth of a patient

② – A surgeon observing the internal organs in the body of a patient

③ – A student observing cells in a blood sample in the laboratory

④ – A cricket lover watching a cricket match from a far end of a pavilion

(i) (a) In which occasion a concave mirror was used?

(b) Represent with a ray diagram, the way in which an image is formed in such a situation (Here, take the object as $\overset{A}{\uparrow}_{O}$).

(ii) (a) What was the occasion where an instrument with optical fibres was used?

(b) What is the name used for the phenomenon that the light rays undergo when light passes through an optical fibre?

(c) State the conditions that should be fulfilled to occur the phenomenon that is mentioned in (b) above.

(d) Another instrument where the phenomenon mentioned in (b) above occurs, was also used in another occasion given above. Mention that occasion and write down the name of the instrument that was being used in that occasion.

(*Total marks* 20)

* * *