July 2009 Theory

1. a) i) What is *indigestion*?
   ii) State **three** ways of preventing indigestion.
   b) State **two** conditions **each** under which the following seedbeds are used:
   i) raised seedbeds;
   ii) sunken seedbeds.
   c) List **two** input devices of a computer.
   d) i) State **two** reasons why parallel wiring is used in the home.
   ii) An electric pressing iron is rated 1000 W, 240 V. Calculate the resistance of the filament?
   e) i) What is an *acid*?
   ii) Why is sulphuric acid a stronger acid than ethanoic acid?

Solution

a) i) **Indigestion** occurs when complex organic molecules or food substances ingested fail to be hydrolysed or broken down into simple substances.

ii) *Ways of preventing indigestion*
- Food should be well cooked.
- Food should be chewed properly.
- Avoid oily and fatty foods.
- One should be emotionally free without feeling of anxiety during or just after eating.
- Avoid eating too much at a time.
- Avoid going to sleep immediately after eating.
- Avoid eating late at night.

b) i) *Conditions for using raised seedbeds*
- In high rainfall areas
- Poor drainage or water logged areas
- During rainy seasons

ii) *Conditions for using sunken seedbeds*
- Low rainfall areas
- During the dry season
- When there is the need to conserve moisture

c) *Input devices of a computer*
- Keyboard
- Mouse
- Touch screen
- Image scanner
- Fax machine
- Bar code reader
- Magnetic-ink character recognition
- Optical mark recognition
- Voice-input devices
- Mobile phones
- Cameras

d) i) *Reasons why parallel wiring is used in the home*
- Maintain the same voltage (potential difference) on all appliances.
- Defective appliance does not affect other appliances.

ii) $Power(P) = \dfrac{\text{Voltage}^2(V^2)}{\text{Resistance}(R)} = \dfrac{V^2}{R}$

$\Rightarrow R = \dfrac{V^2}{P} = \dfrac{240^2}{1000} = 57.6\ \Omega$

e) i) **Acid** is a substance which can give hydrogen ions to another substance. **OR**
An **acid** is a proton donor. **OR**
Acid is a substance whose aqueous solution produces hydrogen ions or forms hydrogen ions when dissolved in water. **OR**
Acid is a substance which contains hydrogen and which can be replaced wholly or partially by a metal. **OR**
An **acid** is substance which has a replaceable hydrogen atom.

ii) Sulphuric acid fully or completely ionized or dissociates in aqueous solutions and therefore contain higher concentrations of hydrogen ions. **OR**

Ethanoic acid is partially ionized or dissociates in aqueous solution and therefore has lower concentration of hydrogen ions.

2. a) i) Define the *focal length of a convex lens*.
   ii) An object is placed 15 cm in front of a convex lens of focal length 10 cm. Calculate the image distance.
   b) i) Explain the term *nuclear decay*.
   ii) Copy and complete **each** of the following radioactive reactions by providing the missing mass and atomic numbers.

   α) $^{234}_{90}\text{Th} \rightarrow \;_{91}\text{Pa} + \;_{-1}\text{e}$

   β) $_{88}\text{Th} \rightarrow \;^{222}\text{Pa} + \;^{4}_{2}\text{He}$

   c) i) What is a *hedge*?
   ii) State **three** uses of hedges.
   d) i) Explain the term *female circumcision*.
   ii) Give **two** reasons why female circumcision should be stopped.

Solution

a) i) **Focal length** of a convex lens is the distance between the principal focus and the centre of the lens.
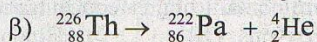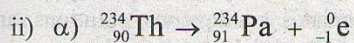
   ii) $\dfrac{1}{f} = \dfrac{1}{u} + \dfrac{1}{v}$

   $\dfrac{1}{v} = \dfrac{1}{f} - \dfrac{1}{u} = \dfrac{1}{10} - \dfrac{1}{15} = \dfrac{15-10}{150} = \dfrac{5}{150}$

   $v = 30\,\text{cm}$

b) i) **Nuclear decay** is the breakdown of radioactive elements to emit radiations.
   OR
   Nuclear decay is the disintegration of unstable atomic nuclei to form stable nuclei.

   ii) α) $^{234}_{90}\text{Th} \rightarrow \;^{234}_{91}\text{Pa} + \;^{0}_{-1}\text{e}$

   β) $^{226}_{88}\text{Th} \rightarrow \;^{222}_{86}\text{Pa} + \;^{4}_{2}\text{He}$

c) i) A **hedge** is a continuous line of shrubs or plants planted close together to serve as boundaries or border.

   ii) *Uses of hedges*
   - Add beauty to landscape
   - To divide a park or garden into sections or portions
   - To keep off livestock or trespassers from entering into beds or boarders or gardens
   - To screen off unsightly areas
   - To provide shade

d) i) *Female circumcision* is the cutting away or removal of the clitoris or vagina lips or vulva or labia.

   ii) *Reasons why female circumcision should be stopped*
   - It is painful.
   - It renders the female insensitive to sexual arousement.
   - It leads to excessive bleeding.
   - It can lead to infection and transmission of diseases such as AIDS.
   - Pains of operation can lead to avoidance of sex.

3. a) State **two** precautions **each** to be taken when carrying out the following practices in fish farming:
   i) stocking of pond with fingerlings;
   ii) feeding of growing fish in a pond.
   b) State **one** functions **each** of the following reproductive hormones:
   i) oestrogen;
   ii) testosterone;
   iii) progesterone;
   iv) prolactin.
   c) Explain **each** of the following observations:
   i) A balloon filled with hydrogen gas floats in air.
   ii) A ship made of steel floats in water.
   d) i) What are *fats*?

ii) State **two** differences between *fats* and *oils*.

e) State **two** ways of ensuring that information stored on a diskette is not lost.

Solution

a) i) **Precautions to be taken when stocking of pond with fingerlings**
- Starve fingerlings for 24 hours before transportation.
- Stock pond with right number of fish to avoid overcrowding.
- Ensure that water in which fingerlings were before transferring into pond is of the same temperature as that of the pond.
- Do not throw fish into the pond but should be allowed to swim out of their container into the pond.

ii) **Precautions to be taken when feeding of growing fish in a pond**
- Avoid over-feeding fish.
- Feed with higher protein content should be given to the fingerlings.
- Accumulation of uneaten food in the pond must be prevented.

i) **Oestrogen** is responsible for the development of female secondary sexual characteristics.

ii) **Testosterone** is responsible for the development of male sexual characteristics.

iii) **Progesterone**
- inhibits ovulation
- makes the uterus very muscular
- regulates menstrual cycle
- maintains pregnancy

iv) **Prolactin** produces and releases breast milk.

i) **Why a balloon filled with hydrogen gas floats in air**
- The average density of the balloon containing hydrogen gas is less than the density of air.

- The weight of air which will be displaced by the balloon with hydrogen gas is greater than that of the balloon.
- The balloon is acted upon by a resultant upward force equal to the difference between the weight of the balloon and weight of air or the resultant force provides the lifting power of the balloon.

ii) **Why a ship made of steel floats in water**
- The ship floats because it is hollow and has a large volume;
- Hence its average density is less than that of water.
- As a result it displaces water equal to its weight.

d) i) **Fats** are solids esters or lipids or triglycerides (trihydroxyalcohol) obtained from the reaction between glycerol and long chain carboxylic or fatty acid.

ii) **Difference between fats and oils**

Fats	Oils
Solid or semi-solid at room temperature	Liquid at room temperature
Saturated	Unsaturated
Higher melting point	Lower melting point

e) **Ways of ensuring that information stored on a diskette is not lost**
- Do not bend or fold
- Keep away from very hot or cold temperatures
- Keep away from magnets
- Keep away from dust
- Do not put heavy objects on diskette
- Insert or remove diskette from drive gently
- Keep in cool or dry place
- Avoid contact with water

4. a) State **three** economic activities associated with water.

b) i) Explain the term *liming* as applied to soil.

ii) State **three** advantages of liming.

c) i) What is *excretion*?
   ii) Explain why animals have specialized excretory organs but plants do not.
d) i) Define *kinetic energy*.
   ii) Calculate the kinetic energy of a body of mass 2000 g moving with velocity of 4 ms^{-1}.

Solution

a) *Economic activities associated with water*
- To generate electricity
- For irrigation or watering plants
- For bleaching
- For cooling
- As a solvent for industries
- To produce steam to drive engines or turbines
- For washing and cleaning

b) i) **Liming** is the process whereby certain calcium compounds or ash are added to the soil to reduce acidity of the soil.

   ii) *Advantages of liming*
   - Improvement in soil structure
   - Efficiency and effective use of agrochemicals such as herbicides
   - Better performance of soil micro/macro organisms
   - Enhances control of soil-borne plant diseases
   - Enhancement of absorption and utilization of essential elements
   - Reduces soil acidity

c) i) **Excretion** is the elimination or removal of the metabolic waste products from the cells or tissues of the body.

   ii) *Why animals have specialized excretory organs but plants do not*
   - Plants are much less active than animals and hence produce metabolic waste products at a much slower rate.
   - Some of the excretory products of plants are re-used by the plants and others are stored.

d) i) **Kinetic energy** is the energy possessed by a moving body. **OR**
   Kinetic energy is the energy possessed by a body by virtue of its motion.

   ii) $KE = \frac{1}{2}mv^2$

   $m = 2000\,g = 2\,kg;\quad v = 4\,ms^{-1}$

   $KE = \frac{1}{2} \times 2 \times 4^2 = 16\,J$

5. a) i) What is *transpiration*?
      ii) State **three** reasons why transpiration is necessary in plants.
   b) State **four** ways of maintaining farm tools.
   c) i) What is *echo*?
      ii) Explain why echoes are undesirable in big halls.
   d) i) What is a *standard solution*?
      ii) A solution is made by dissolving 47.5 g of potassium iodide (KI) in 300 cm^3 of water. Calculate the concentration of KI in moles/litre. [K = 39, I = 27]

Solution

a) i) **Transpiration** is the loss of water vapour or evaporation from the leaves or stems of plants or upper part of a plant or shoot.

   ii) *Reasons why transpiration is necessary in plants*
   - Helps the plants to cool down
   - Enables cells to be active and to remain in the state of turgor
   - Enhances the intake of mineral salts
   - Assists plants to get rid of excess water
   - Enhances the absorption of water by the root hairs

b) *Ways of maintaining farm tools*
- Keep the tools clean after use
- Use tools for the purpose for which they were intended
- Keep tools in a safe or cool and dry place
- Oil or grease tools when they are to be stored for a long time

- Sharpen tools before use
- Repair all broken or damage parts
- Keep tools in a termite-free area

c) i) **Echo** is the sound heard when sound waves are reflected from hard surfaces.

  ii) *Why echoes are undesirable in big halls*
- Echoes interfere with the original sound thereby making hearing difficult.

d) i) **Standard solution** is a solution which contains known amount of solute in a given volume of solution. **OR**
Standard solution is a solution whose exact concentration is known.

  ii) Molar mass of potassium iodide (KI)
$= 39 + 27 = 66$

Number of moles of KI $= \dfrac{\text{Mass}}{\text{Molar mass}}$

$= \dfrac{47.5}{66} = 0.72$

Volume of solution in $dm^3 = \dfrac{300}{1000}$

$= 0.3 \, dm^3$

Concentration $= \dfrac{\text{Number of moles}}{\text{Volume in } dm^3}$

$= \dfrac{0.72}{0.3} = 2.4 \, mol/dm^3$

6. a) State **three** functions of a computer mouse.
  b) Explain the following terms as applied to poultry keeping:
     i) hatching eggs;
     ii) brooder house.
  c) i) What is *breathing*?
     ii) Name **three** disorders associated with the respiratory system of humans.
  d) Explain why a fan rotation in a room may make you feel cooler even though the temperature remains the same.

  e) State **four** positive effects of mining on the Ghanaian economy.

Solution
a) *Functions of a computer mouse*
- Used for selecting text for editing
- Directs the position or movement of the cursor on the screen
- Used for drawing pictures
- Used for playing computer games
- Used for searching for programmes

b) i) **Hatching eggs** are fertilized eggs. **OR**
Hatching eggs are eggs produced by a hen that has been crossed by a cock.

  ii) **Brooder house** is a structure that is specially built to keep or raise day-old chicks till they develop feathers to maintain their body temperature.

c) i) **Breathing** is the process of intake of air or oxygen from the atmosphere into the lungs and the release of air or carbon dioxide from the lungs into the atmosphere. **OR**
Breathing is the exchange of gases between the lungs and the atmosphere.

  ii) *Disorders associated with the respiratory system of humans*
- Lung cancer
- Asthma
- Whooping cough
- Tuberculosis
- Pneumonia
- Bronchitis
- Hay fever
- Severe Acute Respiratory Syndrome (SARS)
- Catarrh or common cold

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d) *Why a fan rotation in a room may make you feel cooler even though the temperature remains the same*

- The moving air dries the moisture or sweat on the body.
- As the moisture or sweat evaporates from the body, it takes latent heat of evaporation from the body and the temperature of the body reduces.

e) *Positive effects of mining on the Ghanaian economy*

- Minerals are exported to provide income as well as some foreign exchange.
- Provision of jobs for many people.
- Communities within the mining areas often gain certain social amenities from the mining companies.
- Attraction of foreign investors into the country.
- Communities are easily linked up with other parts of the country.
- Increase in government revenue or per capita Income.