SCIENCE

Public Exam Special Guide

All book back One mark,
Two mark and Five mark Questions
based on the new blue print

A Product from
Way to Success Team
www.waytosuccess.org way2s100@gmail.com
SSLC PUBLIC EXAM

SPECIAL GUIDE

For Fast Revision

10

SCIENCE

Production Team
Dr. S. Denis Arockiaraj M.Sc., M.Ed., M.Phil., Ph.D (RANKERS)
Associate Professor of Chemistry, St. Joseph’s College, Trichy

&
Mr. K. Chinnappan M.Sc., M.A., B.Ed
Mr. T. Sambath Kumar M.Sc., M.A., B.Ed
Mr. B. Libin M.Sc., B.Ed, M.Phil

-----For subject related clarifications-----

Mail us: remodprince@gmail.com & way2s100@gmail.com

Visit us: www.waytosuccess.org

You can download free study materials from our website
Dear students …Greetings

Way to Success Science Special Guide is now in your hands. It is prepared as a minimum learning material for your fast revision before the public Examination. It is also very useful for slow learners.

One Mark Questions:
Here we give only the Objective type One Mark Questions from the lessons in which the public questions are asked based on the blueprint. All the given questions are very important and given in the text book. You can definitely get 12 to 15 marks by studying the questions given in this book. Slow learners can study only these given questions. But bright students should study extra questions in addition to the given questions.

Two Mark Questions:
Here we give only the book back Two Mark Questions from the lessons in which the public questions are asked based on the blueprint. In this section 32 questions will be asked in the public examination. You have to write 20 questions from that. So students should carefully select the lessons and study. 18 questions will be asked from the lessons 1, 5, 6, 8, 16, 17. Give importance to these lessons. If you study the lessons 9, 11, 12, 15 you will be able to answer another 8 questions. So slow learners can study all the questions from the above 10 lessons. Questions marked with ★ are very important. Bright students can study extra questions from the above 10 lessons

Five Mark Questions:
Here we give only the book back Five Mark Questions from the lessons in which the public questions are asked based on the blueprint. You will get 15 to 20 marks by Studying only 4 units i.e 2, 7, 10 and 17. Slow learners can study these lessons. Bright students can study all the lessons given in this book. Questions marked with ★ are very important.

Slow learners, who are not able to study the above method, can study only the lessons 2, 7, 10, 17. From that you will able to 3 one mark questions, 10 two mark questions and 4 five mark questions. You will definitely get 35 marks from these lessons. If you study one mark questions from other lessons, it will help you to get more marks.

Wish you all the best to get a grand success in the Public Examination!

For Copies: Contact following phone Numbers
9787609090, 9787201010, 8680810626
ONE MARK QUESTIONS - BIOLOGY

One mark questions will be asked from the following lessons:
Heredity and Evolution(1), Immune System(2), Human body Structure(3), Reproduction in plants(4), Mammals(5), Life processes(6), Waste water management(8), Solutions(9), Chemical reaction(11), Classification of elements(12), Carbon and its compounds(13), Measurements(14), Laws of motion(15), Electricity and Energy(16), Electric current and Light(17).

UNIT-1 HEREDITY AND EVOLUTION (PUBLIC QN 1)

1. Mendel observed 7 pairs of contrasting characters in Pism sativum. Which one of the following is not a part of that? [June-2014, June-2015]
   i) Tall and dwarf
   ii) Terminal and axial flower
   iii) Yellow and green seed colour
   iv) Smooth and rough stem

   i) Africa
   ii) America
   iii) Australia
   iv) India

3. Which of the following is inheritable? [June-2013, Mar-2016]
   i) an altered gene in sperm
   ii) an altered gene in liver cells
   iii) an altered gene in skin cells
   iv) an altered gene in udder cells

4. The theory of Natural Selection was proposed by -- [Mar-12, 14, Sep-13, 14, 15, 16, Jun-16]
   i) Charles Darwin
   ii) Hugo de Vries
   iii) Gregor Johann Mendel
   iv) Jean Baptise Lamarck

5. Somatic gene therapy causes ---------
   i) changes in sperm
   ii) changes in progeny
   iii) changes in body cell
   iv) changes in ovum

6. In a pea plant, the yellow colour of the seed dominates over the green colour. The genetic make up of the green colour of the seed can be shown as ---------
   i) GG
   ii) Gg
   iii) Yy
   iv) yy

7. Some people can roll their tongue and this is a genetically controlled autosomal dominant character. [Roller = RR / Rr and Non-roller = rr] A child who can roll the tongue has one brother who is a non-roller and two sisters who are rollers. If both the parents are rollers, the genotypes of their parents would be ---------
   i) RR × RR
   ii) Rr × Rr
   iii) RR × rr
   iv) rr × rr

8. Hydra, a multi-cellular invertebrate of phylum cnidaria (coelenterata) can give rise to new offspring by various methods. Choose the method by which the offspring are produced with significant variations.
   i) budding
   ii) regeneration
   iii) sexual reproduction
   iv) asexual reproduction

9. The following are the events in the formation of the first cloned animal – the sheep Dolly.
   a) Removal of haploid nucleus from the ovum.
   b) Implantation of ovum with diploid nucleus into the surrogate mother.
   c) Collection of udder cell from the sheep.
   d) Injection of diploid nucleus of udder cell into the enucleated ovum.
   e) Development of a young clone.
   The correct sequential order of these events is ---------
   i) a,b,c,d,e
   ii) c,a,b,e,d
   iii) c,a,d,b,e
   iv) e,d,c,b,a

10. The following are statements about stem cells:
    a) They are unspecialised / undifferentiated cells.
    b) They can be transformed into any type of body cell.
    c) They can multiply rapidly to form a large number of similar types of cells.
    d) They cannot transform into cardiac cells or nerve cells.
    e) They are obtained from reproductive progeny only.
    The correct statements are ---------
1. In persons suffering from insulin-dependent diabetes, the -------- cells of pancreas are degenerated.

2. Which one of the following is not socially balanced?
   i) He enjoys a birthday party ii) He behaves rudely over trivial matters iii) He adjusts well to the surrounding situation iv) He attends to his ailing mother at the hospital

3. One of the means of indirect transmission of a disease is
   i) sneezing ii) coughing iii) through placenta iv) using utensils of patients [Mar-2015]

4. When antibodies, extracted from other animals are injected into your body, what kind of immunity do you gain?
   i) Artificially active acquired immunity ii) Artificially passive acquired immunity iii) Naturally active acquired immunity iv) Naturally passive acquired immunity

5. The first vaccine injected into a just born baby is
   i) Oral polio ii) DPT iii) DPT and Oral polio iv) BCG [Sep-2014,16, Jun-15, Mar-17]

6. A child eats food rich in carbohydrates and avoids protein in its diet. Which type of nutritional deficiency will affect that child?
   i) Kwashiorkar ii) Nyctalopia iii) Diabetes iv) Down syndrome
12. **Assertion (A):** Expulsion of excess unused glucose in the blood through urine is observed in a diabetic mellitus person.
**Reason (R):** Insulin is not produced in sufficient quantity by pancreas.
   i) Both ‘A’ and ‘R’ are true and ‘R’ explains ‘A’  
   ii) Both ‘A’ and ‘R’ are true but ‘R’ doesn’t explain ‘A’. 
   iii) Only ‘A’ is true but ‘R’ is false.  
   iv) A is false but ‘R’ is true.

---

**UNIT-3 STRUCTURE AND FUNCTIONS OF HUMAN BODY-ORGAN SYSTEMS (PUBLIC QN 1)**

1. Unipolar neurons are found in the -----------
   i) Brain  
   ii) Spinal Cord  
   iii) Embryonic nervous tissue  
   iv) Adult nervous tissue

2. The sensory organs contain -----------
   i) Unipolar neuron  
   ii) Bipolar neuron  
   iii) Multipolar neuron  
   iv) Medullated neuron

3. The part of brain which controls emotional reactions in our body is ----------- [Mar-2016]
   i) Cerebellum  
   ii) Cerebrum  
   iii) Thalamus  
   iv) Hypothalamus

4. One of the following is a part of the brain stem. Pick it out.
   i) Forebrain and midbrain  
   ii) Midbrain and hindbrain  
   iii) Forebrain and hindbrain  
   iv) Forebrain and spinal cord

5. Spinal nerves are-----------
   i) sensory nerves  
   ii) motor nerves  
   iii) mixed nerves  
   iv) innervating the brain

6. An endocrine gland found in the neck is ----------- [Jun-2016]
   i) adrenal gland  
   ii) pituitary gland  
   iii) thyroid gland  
   iv) pancreas

7. An endocrine gland which is both exocrine and endocrine is the ----------- [Sep-2016]
   i) pancreas  
   ii) pituitary  
   iii) thyroid  
   iv) adrenal

8. Normal blood glucose level in 1dl of blood is -----------
   i) 80-100 mg/dl  
   ii) 80-120 mg/dl  
   iii) 80-150 mg/dl  
   iv) 70-120 mg/dl

9. The “T” lymphocytes are differentiated to resist infection in the -----------
   i) parathyroid gland  
   ii) lymph gland  
   iii) thymus gland  
   iv) adrenal gland

10. In Meiosis-I, the pairing of homologous chromosomes take place during ----------- stage.
   i) leptotene  
   ii) zygotene  
   iii) pachytene  
   iv) diplotene

11. The two systems of the human body which help in the control and co-ordination of metabolic activities are -----------
   i) digestive and circulatory  
   ii) respiratory and circulatory  
   iii) excretory and skeletal  
   iv) nervous and endocrine

12. Neurotransmitters are released at the synapse by-----------
   i) Tips of Dendrites  
   ii) Synaptic Knobs  
   iii) Organelles of Cyton  
   iv) Myelin sheath of Axon

13. The endocrine gland related to the immune system is ----------- [Mar-2017]
   i) Thyroid  
   ii) Thymus  
   iii) Adrenal  
   iv) Pineal

14. The hormone administered by doctors to a pregnant woman to help in childbirth during the time of natural delivery is-----------.
   i) Oestrogen  
   ii) Progesterone  
   iii) Insulin  
   iv) Relaxin

15. The important event of meiosis is the crossing over. It occurs during -----------.
   i) Leptotene  
   ii) Pachytene  
   iii) Diplotene  
   iv) Zygotene

16. Reduction division is the process by which gametes are produced. The cells in which reduction division take place are -----------
   i) germinal epithelial cells  
   ii) the sensory epithelial cells  
   iii) cuboidal epithelial cells  
   iv) columnar epithelial cells

17. In Amoeba, the cell division takes place -----------
   i) involving changes in the chromatin reticulum  
   ii) without involving changes in the chromatin reticulum
iii) leading to reduction in the number of chromosomes
iv) without dividing the nucleus

18. Pick out the item which has sequential arrangement.

   i) zygotene ——> Leptotene ——> Pachytene ——> Diplotene ——> Diakinesis
   ii) Diakinesis ——> zygotene ——> Leptotene ——> Pachytene ——> Diplotene
   iii) Leptotene ——> zygotene ——> Pachytene ——> Diplotene ——> Diakinesis

19. Polio is a viral disease and the affected child suffers from physical disability of limbs. Which system of the body is mostly affected due to this infection?
   i) Nervous system  ii) Digestive system  iii) Respiratory system  iv) Excretory system

20. Blinking when a beam of light is suddenly focused on the eyes and sudden withdrawal of hand upon touching a hot body are some of the examples of reflex actions. Which part of the central nervous system acts as the centre these actions?
   i) Forebrain  ii) Spinal cord  iii) Hindbrain  iv) Synapse

21. The following are the parts of a neuron:
   a) Axon  b) Terminal branches  c) Cyton  d) Dendrites
   The correct pathway of a nerve impulse through these parts are---------
   i) badc  ii) dcab  iii) bdc  iv) adbc

22. For minor surgeries in the body, doctors administer local anaesthesia to a part of the body so that the pain will not be felt by the patient. At which part, do you think, the nerve impulse is being arrested due to the effect of anaesthesia?
   i) at cyton  ii) at axon  iii) at synapse  iv) in the middle of axon

23. Assertion (A) : All spinal nerves are mixed nerves.
   Reason (R) : Each spinal nerve has a sensory root and a motor root.
   i) Both ‘A’ and ‘R’ are true and ‘R’ explains ‘A’.
   ii) Both ‘A’ and ‘R’ are true but ‘R’ doesn’t explain ‘A’.
   iii) Only ‘A’ is true but ‘R’ is false.
   iv) ‘A’ is false but ‘R’ is true.

UNIT-4 REPRODUCTION IN PLANTS (PUBLIC QN 1)

1. The method of reproduction in unicellular organisms like amoeba and bacteria in which they split into two equal halves and produce new ones is called ----------
   i) fragmentation  ii) binary fission  iii) budding  iv) spore formation

2. In sexual reproduction of flowering plants, the first event involved in this is ----------
   i) fertilization  ii) germination  iii) regeneration  iv) pollination

3. Which of the following statement is true?
   i) Thin-walled non-mobile spores are called zoospores.
   ii) A motile asexual spore produced by some algae, bacteria and fungi are Akinetes.
   iii) Uninucleate, non-motile, asexual spores produced by fungus are called conidia.
   iv) Thick-walled vegetative cells produced by algae during adverse conditions are called aplanospores.

4. The fertilized ovary is a fruit. The fruit that develops from a single flower with multi carpellary, apocarpous superior ovary is ----------
   i) Aggregate fruit  ii) Composite fruit  iii) Simple fruit  iv) Multiple fruit

5. If a water soaked seed is pressed, a small drop of water comes out through the ----------
   i) stomata  ii) lenticel  iii) micropyle  iv) radicle

6. The mango fruit is called a stone fruit because it has ----------
   i) skinny epicarp  ii) stony mesocarp  iii) fleshy endocarp  iv) hard endocarp

7. Pick out the wrong statement.
   i) In a dicot seed there is a short longitudinal whitish ridge called the raphae.
   ii) The minute opening in a dicot seed is known as micropyle.
   iii) The rudimentary stem portion is known as radicle.
iv) The rudimentary root portion is called radicle.

8. Consider the following statements regarding the dispersal of fruits and seeds by wind and select the correct answer.
   i) Fruits and seeds are dispersed with a sudden jerk by an explosive mechanism.
   ii) The fruits of tridax carry a persistent calyx modified into pappus.
   iii) The fruits of xanthium have sharp pointed stiff hooks.
   iv) The mesocarp of coconut is fibrous.

9. The product of triple fusion which acts as nutritive tissue for the development of an embryo is
   i) zygote  ii) placenta  iii) scutellum  iv) endosperm  [Mar-2014, June-2015]

10. The disadvantage of self-pollination is --------------
   i) There is no wastage of pollen grains.
   ii) The seeds are less in number.
   iii) Self-pollination is sure in bisexual flowers
   iv) Flowers need not depend on agents of pollination.

11. The flower is important to a plant because it helps in --------------
   i) attracting  ii) production of nectar  iii) pollination
   iv) sexual reproduction

12. The essential organs of the flower are --------------, 
   i) Calyx and Corolla  ii) Androecium and Gynoecium
   iii) Calyx and Androecium  iv) Corolla and Gynoecium

13. Cross pollination is important for producing --------------
   i) new varieties of plants
   ii) plants with better growth
   iii) More viable seeds
   iv) all of the above

14. Anemophily occurs in --------------
   i) Vallisneria  ii) Grass
   iii) Coconut  iv) Datura

15. Which of the following structure / arrangement favours entamophily ?
   i) Pollen grains with wings and feathery stigma
   ii) Colourful petals and nectar secretion
   iii) A bunch of flowers with less pollen
   iv) Pollen grains with mucous covering.

16. Post-fertilization, the ovule changes into a/an --------------  [Mar-2016]
   i) seed  ii) fruit
   iii) endosperm  iv) pericarp.

17. Which of the following is correctly matched?
   i) False fruit – mango
   ii) Multiple fruit – apple
   iii) Aggregate fruit – polyalthia
   iv) Caryopsis – banana

18. Identify the mismatched pair.
   i) Legume – Dry dehiscent fruit
   ii) Cypsela – Dry indehiscent fruit
   iii) Pome – Fleshy fruit
   iv) Regma – Resembles legume

UNIT-5 A REPRESENTATIVE STUDY OF MAMMALS (PUBLIC QN 1)

1. Select important characteristic features of mammals
   i) four-chambered heart
   ii) fore-limbs and hind limbs
   iii) milk-producing glands
   iv) post anal tail

2. Carnivorous animals use these teeth to tear flesh.
   i) incisors  ii) canines
   iii) premolars  iv) molars

3. The Henle’s loop of nephron is mainly responsible for reabsorption of water in the kidney. Which of the following has a long loop of Henle in its nephrons to conserve water?
   i) polar bear  ii) camel
   iii) frog  iv) whale

4. Which blood cells of mammals are concerned with immunity?  [Jun-2016]
   i) Young Erythrocytes  ii) Leucocytes
   iii) Thrombocytes  iv) Matured Erythrocytes

5. You were given two unlabelled slides with blood smears of an amphibian and a mammal. You would differentiate the blood samples by observing the --------------.
   i) colour  ii) nature of RBC’s
   iii) nature of WBC’s  iv) contents of plasma
6. For the digestion of cellulose, an enzyme called cellulase is required. Some mammals lodge cellulase producing bacteria in their digestive system by offering them food and shelter. These mammals are mostly ----------
   i) Herbivores  ii) Carnivores  iii) Omnivores  iv) Sanguivores

7. Forelimbs of mammals have a common basic structure or pattern, but are different in their usage/function in different animals. They can be called ----------.
   i) Homologous organs  ii) Analogous organs  iii) Vestigial organs  iv) Rudimentary organs

8. Sensitive whiskers are found in ---------- [Mar-2012, Sep-2013]
   i) Bat  ii) Elephant  iii) Deer  iv) Cat

9. The tusks of elephants are modified ---------- [Mar-2012, Sep-2013]
   Ans: Incisors

10. Pick out an animal which has a four-chambered stomach. [Sep-2014]
    i) Elephant  ii) Dolphin  ii) Deer  iv) Kangaroo

11. Normal body temperature of man is ---------- [June-2014, Mar-2016, Sep-2016]
    i) 98.4 – 98.6°F  ii) 96.6 – 96.8°F  iii) 94.4 – 98.6°F  iv) 98.4 – 99.6°F

12. Mitral valve is found between ---------- [Mar-2017]
    i) Right auricle and right ventricle  ii) Left auricle and left ventricle
    iii) Right ventricle and pulmonary artery  iv) Left ventricle and aorta

13. Assertion (A) : Mammalian heart is called myogenic heart. [Mar-2016 – 2 mark]
    Reason (R) : Heartbeat is regulated by a specialized muscle bundle (pacemaker) in mammals.
    i) Both A and R are true and R explains A  ii) Both A and R are true but R doesn’t explain A.
    iii) ‘A’ is true but ‘R’ is false.  iv) A is false but ‘R’ is true.

14. One of the following groups contains a non-mammalian animal. Pick up the group [Mar-2013, June-2013]
    i) dolphin, walrus, porcupine, rabbit, bat  ii) elephant, pig, horse, donkey, monkey
    iii) antelope, deer, cow, buffalo, black buck  iv) dog, cat, crocodile, lion, tiger

15. The epidermis of mammals contains--------- [Sep-2013, Mar-2014, June-2014]
    i) hair, bristles, quills  ii) hair, nails, claws  iii) hair, bristles, horns  iv) hair, nails, scales

16. Based on relationship, fill in:
    Ans: Wing like structure (Patagium)

17. Fill in the blank.
    RBC: Carrier of oxygen,  WBC: ---------- [Mar-2013, Mar-2014]
    Ans: produces antibodies to resist the germs entering the body

18. Based on modifications, make the pairs:
    incisor: tusks of elephant,  ---------- : quills of porcupine [Sep-2012, June-2013]
    Ans: Hairs

UNIT-6 LIFE PROCESSES (PUBLIC QN 1)

1. In monotropa the special type of root which absorbs nourishment is the ---------- [Sep-2013, Mar-17]

2. The product obtained in the anaerobic respiration of yeast is ---------- [Mar-14, Jun-15, 2016, Sep-2016]
   i) Lactic acid  ii) Pyruvic acid  iii) Ethanol  iv) Acetic acid

3. The roots of a coconut tree are seen growing far from the plant. Such a kind of movement of root for want of water is ---------- [Sep-2015]
   i) Phototropism  ii) Geotropism  iii) Chemotropism  iv) Hydrotropism

4. The xylem in the plants is responsible for ---------- [June-2012, Mar-2013, June-2014, Mar-2015]
   i) transport of water  ii) transport of food
iii) transport of amino acids  iv) transport of oxygen

5. The autotrophic nutrition requires  \( \text{[Sep-2012, June-2013, Sep-2014]} \)
   i) CO\(_2\) and water  ii) chlorophyll  iii) sunlight  iv) all the above

6. Leaf pores / stomata help in ---------------
   i) intake of CO\(_2\) during photosynthesis  ii) release of O\(_2\) during photosynthesis
   iii) release of water vapour during transpiration  iv) All of these

7. --------------- of green plants are called factories of food production.  \( \text{[Mar-2016]} \)
   i) Mitochondria  ii) Chloroplasts  iii) Endoplasmic reticulum  iv) Nucleus

8. The special root-like structure of plant parasites in cuscuta and viscum are called ------------
   i) Rhizoids  ii) Haustoria  ii) Hyphae  iv) Stolons

9. Pick out the odd one : The parts of the alimentary canal are ---------------  \( \text{[Mar-2015]} \)
   i) pharynx  ii) mouth  iii) buccal cavity  iv) pancreas

UNIT-7 CONSERVATION OF ENVIRONMENT (PUBLIC QN 0)
One mark Questions will not be asked in this lesson

UNIT-8 WASTE WATER MANAGEMENT (PUBLIC QN 1)

1. An example of water-borne disease is  \( \text{[Jun-2016]} \)
   i) scabies  ii) dracunculiasis  iii) trachoma  iv) typhoid

2. The sedimented and floating materials are removed by this treatment process.  \( \text{[Mar-2017]} \)
   i) primary treatment  ii) secondary treatment  iii) tertiary treatment  iv) peripheral treatment

3. Which is a non-renewable resource?  \( \text{[Mar-2013, Jun-2016]} \)
   i) coal  ii) petroleum  iii) natural gas  iv) all the above

4.  \( \text{[Mar-16, Sep-16]} \)
   i) ethane  ii) methane  iii) propane  iv) butane

ONE MARK QUESTIONS – CHEMISTRY

UNIT-9 SOLUTIONS (PUBLIC QN 1)

1. A true solution is a homogeneous mixture of solute and solvent. Chalk powder in water is a heterogeneous mixture. Is it a true solution?
   Ans: No. It is a suspension

2. A solution that contains water as the solvent is called an aqueous solution. If carbon disulphide is a solvent in a given solution, then the solution is called  \( \text{[Mar-2013, Jun-2016]} \)
   (aqueous solution, non-aqueous solution)
   Ans: Non-aqueous solution

3. The solubility of common salt in 100g of water is 36g. If 20g of salt is dissolved in it how much more is required to attain saturation.
   Ans: 16 g

4. If two liquids are mutually soluble, they are called  \( \text{[Sep-2014]} \)
   liquids. (miscible, immiscible)
   Ans: miscible

5. When sunlight passes through window of the classroom, its path is visible. This is due to  \( \text{[Sep-2013, Mar-2014, Sep-2015, 16]} \)
   (reflection, scattering)
   Ans: scattering

6. The particles in various forms are visible only under ultra microscope. A solution containing such particles is called  \( \text{[June-2014]} \)
   (True solution / colloidal solution)
   Ans: Colloidal solution

7. The number of components in a binary solution are/is  \( \text{[one / two]} \)
Ans: two

8. The mixture of gases used by deep sea divers is -------------- (Helium-oxygen, oxygen-nitrogen)

9. Soil cannot store more nitrogen than it can hold. Hence soil is said to be in a state of ------- (saturation, unsaturation) 
   Ans: saturation [June-2015]

10. In an endothermic process, solubility increases with ---- in temperature. (increase, decrease) [Mar-16]
    Ans: increase

11. Aquatic species are more comfortable in cold water because --------------
    i) as the temperature decreases, the solubility of dissolved oxygen increases.
    ii) as the temperature increases, the solubility of dissolved oxygen increases.
    iii) as the temperature increases, the solubility of dissolved oxygen decreases.
    Ans: i) as the temperature decreases, the solubility of dissolved oxygen increases.

UNIT-10 ATOMS AND MOLECULES (PUBLIC QN 0)
One mark Questions will not be asked in this lesson

UNIT-11 CHEMICAL REACTIONS (PUBLIC QN 1)

1. Zn + 2HCl ----> ZnCl₂ + H₂↑
   The above reaction is an example of --------------
   a) Combination reaction   b) Double displacement reaction [Mar-2012]
   c) Displacement reaction   d) Decomposition reaction.

2. A reddish brown coloured element ‘X’ on heating in air becomes black coloured compound ‘Y’. X and Y are -------- and -------- (Cu, CuO / Pb, PbO).
   Ans: Cu, CuO

3. A student test the pH of pure water using a pH paper. It shows green colour. If a pH paper is used after adding lemon juice to water, what colour will he observe? (Green / Red / Yellow)
   Ans: Red

4. Chemical volcano is an example of (combination reaction / decomposition reaction) [Mar-2014, June-2014, Mar-2016]
   Ans: decomposition reaction

5. When crystals of lead nitrate on heating strongly produces -------- gas and the colour of the gas is ------
   Ans: Nitrogen dioxide (NO₂) gas, Reddish brown

6. When aqueous solution of silver nitrate and sodium chloride are mixed, ------ precipitate is immediately formed (white / yellow / red).
   Ans: White

7. Aluminium can displace Zinc metal from aqueous solution of Zinc sulphate because -------- (zinc is more reactive than aluminium / aluminium is more reactive than zinc ).
   Ans: Aluminium is more reactive than zinc

8. To protect tooth decay, we are advised to brush our teeth regularly. The nature of the tooth paste commonly used is -------- in nature. [Sep-2013, Jun-2016]
   Ans: basic

9. Vinegar is present in acetic acid. Curd contains -------- acid (Lactic acid / Tartaric acid / Citric acid).
   Ans: Lactic acid [Mar-2013, Mar-15, Sep-15, Mar-17]

10. pH = −log₁₀ [H⁺]. The pH of a solution containing hydrogen ion concentration of 0.001M solution is -------- (3 / 11 / 14) [June-2013, Sep-2014, June-2015]
    Ans: 3
## UNIT-12 PERIODIC CLASSIFICATION OF ELEMENTS (PUBLIC QN 1)

1. In the modern periodic table, periods and groups are given. Periods and groups indicate ________ 
   a) Rows and Columns   b) Columns and Rows
2. The third period contains elements. Out of these elements, how many elements are non-metals? (8, 5 )
   **Ans:** 5  
   Note: i) First period contains 2 elements. Both are non-metals. ii) Second period contains 8 elements, out of these elements 6 elements are non-metals & 2 elements are metals.
3. An element which is an essential constituent of all organic compounds belongs to the ________ group.
   (14th group / 15th group)  
   **Ans:** 14th group
4. Ore is used for the extraction of metals profitably. Bauxite is used to extract aluminium, it can be termed as_________ (ore / mineral)
   **Ans:** Ore
5. Gold does not occur in the combined form. It does not react with air or water. It is in the ________ state
   (native / combined)  
   **Ans:** Native

## UNIT-13 CARBON AND ITS COMPOUNDS (PUBLIC QN 1)

1. **Assertion:** Chemical bonds in organic compounds are covalent in nature.  
   **Reason:** Covalent bond is formed by the sharing of electrons in the bonding atoms. Does the reason satisfy the given assertion?
   **Ans:** Yes the reason satisfies the assertion.
2. **Assertion:** Diamond is the hardest crystalline form of carbon  
   **Reason:** Carbon atoms in diamond are tetrahedral in nature. Verify the suitability of reason to the given Assertion mentioned above.
   **Ans:** The reason explains the assertion.
   In diamond each carbon atom is bonded to four other carbon atoms (tetrahedral) forming a rigid three dimensional structure, accounting for its hardness and rigidity.
3. **Assertion:** Due to catenation a large number of carbon compounds are formed.  
   **Reason:** Carbon compounds show the property of allotropy. Does the reason hold good for the given Assertion?
   **Ans:** No, the reason is not relevant to the assertion.
4. Buckminster Fullerene is the allotropic form of ________
   (Nitrogen / Carbon / Sulphur)  
   **Ans:** Carbon
5. Eventhough it is a non metal, graphite conducts electricity. It is due to the presence of ________ (free electrons / bonded electrons)  
   **Ans:** Free electrons
6. The formula of methane is CH₄ and its succeeding member ethane is expressed as C₂H₆. The common difference of succession between them is ________ (CH₂ / C₂ H₂)  
   **Ans:** CH₂
7. IUPAC name of the first member of alkyne is ________ (ethene / ethyne)  
   **Ans:** Ethyne
8. Out of ketonic and aldehydic group which is the terminal functional group?  
   **Ans:** Aldehydic group
9. Acetic acid is heated with Na₂CO₃ in a test tube. A colourless and odourless gas (X) is evolved. The gas turns lime water milky. Identify X.
   **Ans:** X is Carbon dioxide (CO₂)
10. **Assertion:** Denaturation of ethyl alcohol makes it unfit for drinking purpose.
**Reason:** Denaturation of ethyl alcohol is carried out by pyridine. Check whether the reason is correct for assertion.

**Ans:** Yes, the reason is correct for assertion.

---

**ONE MARK QUESTIONS - PHYSICS**

**UNIT-14 MEASURING INSTRUMENTS (PUBLIC QN 1)**

1. Screw Gauge is an instrument used to measure the dimensions of very small objects upto ------  
   i) 0.1 cm  ii) 0.01 cm  iii) 0.1 mm  iv) 0.01 mm  
   [Mar-2017]

2. In a Screw Gauge, If the zero of the head scale lies below the pitch scale axis, the zero error is ------  
   i) positive  ii) negative  iii) nil

3. The Screw Gauge is used to measure the diameter of a ------  
   i) crow bar  ii) thin wire  iii) cricket ball  iv) none of these

4. One light year is equal to ------  
   i) $365.25 \times 24 \times 60 \times 60 \times 3 \times 10^8$ m  ii) $1 \times 24 \times 60 \times 60 \times 3 \times 10^8$ m  
   iii) $360 \times 24 \times 60 \times 60 \times 3 \times 10^8$ m

5. One astronomical unit is the mean distance between the centre of the Earth and centre of the ------  
   i) Moon  ii) Sun  iii) Mars

**UNIT-15 LAWS OF MOTION AND GRAVITATION (PUBLIC QN 1)**

1. The acceleration in a body is due to ------  
   i) balanced force  ii) unbalanced force  iii) electro static force

2. The physical quantity which is equal to rate of change of momentum is --------  
   i) displacement  ii) acceleration  iii) force  iv) impulse

3. The momentum of a massive object at rest is ------  
   i) very large  ii) very small  iii) zero  iv) infinity  
   [Sep-2013, Sep-2014, Sep-2015, Mar-2016]

   **Note:**  
   Momentum = mass $\times$ velocity  
   Velocity = 0 for an object at rest  
   $\therefore$ Momentum = 0

4. The mass of a person is 50 kg. The weight of that person on the surface of the earth will be ------  
   i) 50 N  ii) 35 N  iii) 380 N  iv) 490 N  
   [Sep-12, 2016, Jun-13, 2016, Mar-2014]

   **Note:**  
   $w = mg = 50 \times 9.8 = 490$ N

5. The freezing of biotechnology products like vaccines require ---------- freezing system.  

   i) Helium  ii) Nitrogen  iii) Ammonia  iv) Chlorine

6. Two objects of same mass, namely A and B hit a man with a speed of 20 km/hr and 50 km/hr respectively and come to rest instantaneously. Which object will exert more force on that man?  
   **Justify your answer.**  
   Object ‘B’ will exert more force on that man.

   1. The impact produced by an object depends on its mass and velocity.  
      **Momentum of an object = mass $\times$ velocity**
    2. Since object ‘B’ hits the man with greater velocity, it has more momentum and it will exert more force on that man.

7. An object is moving with a velocity of 20 m/s. A force of 10 N is acting in a direction perpendicular to its velocity. What will be the speed of the object after 10 seconds?  
   1. The force acting perpendicular to the velocity will not change the speed.
    2. But change occur only in the direction.
3. Therefore the speed of the body remains unchanged after 10 seconds.

8. **Assertion (A):** Liquefied cryogenic gases are sprayed on electric cables in big cities.
   **Reason (R):** Liquefied cryogenic gases prevent wastage of power.  
   [Sep-2016 - 2 mark]
   
   i) A is incorrect and R is correct.  
   ii) A is correct and R is incorrect  
   iii) Both A and R are incorrect.  
   iv) A is correct and R supports A.  
   Ans: iv) A is correct and R supports A.

9. The acceleration due to gravity on the surface of the earth will be maximum at ---- and minimum at -----
   Ans: Poles, Equator

10. If the radius of the earth is reduced to half of its present value, with no change in the mass, how will the acceleration due to gravity, be affected?
   Ans: Acceleration due to gravity will be increased by 4 times.
   
   **Note:** Acceleration due to gravity, \( g = \frac{GM}{R^2} \)
   
   If the radius of the earth is reduced to half of its present value, then
   
   \[ g = \frac{GM}{\left(\frac{R}{2}\right)^2} = \frac{GM}{\frac{R^2}{4}} = 4\frac{GM}{R^2} \]

11. Selvi placed her purse on the passenger’s seat of her car when she drove to work. By the time she reached her office, her purse had fallen on the floor in front of the passenger’s seat. Why did this happen? Explain.
   1. This happened due to inertia of motion.
   2. When brake is applied, the car slows down but the purse tends to continue in the same state of motion because of its inertia.
   3. So, the purse falls down on the floor in front of the passenger’s seat.

12. Why does a fielder in the game of cricket pull his hands back when he catches a ball?
   1. A cricket player while catching a ball lowers his hands in the direction of the ball.
   2. If the total change in momentum is brought about in a very short interval of time, the average force is very large. Hence, it hurts the player.
   3. By increasing the time interval, the average force is decreased.
   4. It is for this reason that a cricket player while catching a ball, to increase time of contact, the player should lowers his hands in the direction of the ball.

13. From the following statements, choose that which is not applicable to the mass of an object
   i) It is a fundamental quantity.  
   ii) It is measured using physical balance.  
   iii) It is measured using spring balance.  
   [Sep-2013, Mar-2014, Mar-2015]
   Ans: iii) It is measured using spring balance.

14. List out the names of the organisations which are not associated with Chandrayaan-I mission from the following: i) ISRO ii) BARC iii) NASA iv) ESA v) WHO vi) ONGC [June-2014, June-2015]
   Ans: ii) BARC   v) WHO   vi) ONGC

**UNIT-16 ELECTRICITY AND ENERGY (PUBLIC QN 1)**

1. The potential difference required to pass a current 0.2 A in a wire of resistance 20 ohm is
   i) 100 V  
   ii) 4 V  
   iii) 0.01 V  
   iv) 40 V  
   (Note: According to Ohm’s law, \( I = \frac{V}{R} \) \( \therefore V = IR = 0.2 \times 20 = 4 \) V)

2. Two electric bulbs have resistances in the ratio 1 : 2. If they are joined in series, the energy consumed in these are in the ratio
   [Sep-2014]
3. Kilowatt-hour is the unit of -------- [June-2012, Mar-13, Sep-13, Mar-15, Mar-17]
i) potential difference ii) electric power iii) electric energy iv) charge
4. -------- surface absorbs more heat than any other surface under identical conditions. [June-13, 14, 2016, Sep-2014, Sep-2015, Mar-2016]
i) White ii) Rough iii) Black iv) Yellow
5. The atomic number of natural radioactive element is -------- [Mar-2013, Sep-2016]
i) greater than 82 ii) less than 82 iii) not defined iv) atleast 92
6. Which one of the following statements does not represents Ohm’s law? [Sep-2013]
i) current / potential difference = constant ii) potential difference / current = constant
iii) current = resistance × potential difference
7. What is the major fuel used in thermal power plants? Ans: Coal
8. Which is the ultimate source of energy? Ans: Sun
9. What must be the minimum speed of wind to harness wind energy by turbines? Ans: 15 km per hour
10. What is the main raw material used in the production of biogas? Ans: Cow-dung

UNIT-17 MAGNETIC EFFECT OF ELECTRIC CURRENT AND LIGHT (PUBLIC QN 1)

1. The magnification produced by a mirror is + 1/3. Then the mirror is a ----------- (concave mirror, convex mirror, plane mirror ) [Sep-2013,16, Mar-2014]
   Ans: convex mirror
   Note: If m is + ve , image is erect and virtual. If m < 1, image is diminished. Diminished, erect and virtual image is formed only by convex mirror.

2. The phenomenon of producing an emf in a circuit whenever the magnetic flux linked with a coil changes is ----------- ( electromagnetic induction, inducing current, inducing voltage, change in current ) [Mar-2013, Mar-2016]
   Ans: electromagnetic induction

3. An electric current through a metallic conductor produces ----------- around it. ( magnetic field, mechanical force, induced current )
   Ans: magnetic field

4. The field of view is maximum for ----------- (plane mirror, concave mirror, convex mirror) [Sep-2012, June-2013, June-2014, Sep-2015]
   Ans: convex mirror

5. An object is placed 25 cm from a convex lens whose focal length is 10 cm. The image distance is ------- ( 50 cm, 16.66 cm, 6.66 cm, 10 cm ) [Mar-2012, Sep-2015]
   Ans: 16.66 cm
   Note: Lens formula
   \[
   \frac{1}{f} = \frac{1}{v} - \frac{1}{u}
   \]
   For convex lens, u = - 25 cm f = + 10 cm v = ?
   From Lens formula:
   \[
   \frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{10} + \frac{1}{-25} = \frac{1}{10} - \frac{1}{25} = \frac{5 - 2}{50} = \frac{3}{50} = \frac{1}{16.66} cm
   \]

6. From the following statement write down that which is applicable to a commutator.
   a. A galvanometer uses a commutator for deadbeat
b. A transformer uses a commutator to step up voltage

c. A motor uses a commutator to reverse the current

**Ans:** A motor uses a commutator to reverse the current

7. An overhead wire carries current from east to west. Find the direction of the magnetic field 5cm below the wire.

**Ans:** North to south

8. In the arrangement shown in the figure, there are two coils wound on a non-conducting cylindrical rod. Initially the key is not inserted. Then the key is inserted and later removed. Then, which of the following statement is correct?

- a. The deflection in the galvanometer remains zero throughout.
- b. There is a momentary deflection in the galvanometer but it dies out shortly.

**Ans:** b. There is a momentary deflection in the galvanometer but it dies out shortly.

9. Which part of the human eye helps in changing the focal length of the eye lens?

**Ans:** Ciliary muscles

10. A pencil partly immersed in water in a glass tumbler appears to be bent at the interface of air and water. Name the phenomenon of light responsible for it.

**Ans:** Refraction of light

11. Sitting in her parlour one night, Chitra sees the reflection of her cat in the living room window. If the image of her cat makes an angle of 40° with the normal, at what angle does Chitra see the reflected image of the cat?

**Ans:** 80°

12. **Why do the lines of the magnetic field not cross each other?**

1. Outside the magnet, the direction of magnetic field lines is always from the North Pole to the South Pole.
2. Two magnetic lines of force do not intersect each other. If two magnetic lines of force intersect, there would be two directions of magnetic field at the same point which is not possible.

13. **What is the magnetic field midway between two parallel conductors carrying same amount of current in the same direction and in the opposite direction?**

1. The magnetic field midway between two parallel conductors carrying same amount of current in the same direction is zero
2. The magnetic field midway between two parallel conductors carrying same amount of current in the opposite direction will be doubled

14. **How can an AC generator be converted into a DC generator?**

An AC generator can be converted into a DC generator by replacing the slip rings by a split-ring type commutator.

15. **Compute the position of the object placed in front of a concave mirror of focal length ‘f’ so that the image formed is of the same size of the object.**

Position of object is at C (centre of curvature)
TWO MARK QUESTIONS

Two mark questions will be asked from the following lessons:

<table>
<thead>
<tr>
<th>Unit No</th>
<th>Title of the Unit</th>
<th>No.of Questions asked</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Heredity and Evolution</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Immune System</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Human body Structure</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Reproduction in plants</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Mammals</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Life processes</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Environment</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Waste water management</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Solutions</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Atoms and Molecules</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Chemical reaction</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>Periodic Classification of elements</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>Carbon and its compounds</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Measurements</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>Laws of motion</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>Electricity and Energy</td>
<td>3</td>
</tr>
<tr>
<td>17</td>
<td>Electric current and Light</td>
<td>3</td>
</tr>
</tbody>
</table>

32 Questions will be asked. You have to answer 20 questions. If you study units 1, 5, 6, 8, 16, 17 you will be able to answer 18 questions. Then if you study units 9, 11, 12, 15 in addition to the above units, you will be able to answer another 8 questions. If you plan properly, you will be able to answer 20 questions in two mark question section.

TWO MARK QUESTIONS - BIOLOGY

UNIT-1 HEREDITY AND EVOLUTION (PUBLIC QN 3)

1. Mendel has observed Tallness as a dominant character in the garden pea plant. Similarly tongue rolling is a dominant character in man. In a group of 60 students, 45 can roll their tongue and 15 are non rollers.

In the above context, calculate the percentage of dominant and recessive characters.

Ans: The percentage of dominant character = \( \frac{45}{60} \times 100 = 75\% \)

The percentage of recessive character = \( \frac{15}{60} \times 100 = 25\% \)

Ratio between them is 75 : 25 = 3 : 1

2. The inheritable characters vary in different species and within the same species.

Name the variation in the following cases:

i) The eye colour among the human beings are varied as blue, black, brown, green, etc.,
   This is called as -------- variation.

ii) The dentition in the rabbit and the elephant are not the same.
   This is called as -------- variation.

   [June-2012, 2016, Mar-14, Sep-14, Mar-17]

Ans: i) Intra specific    ii) Inter generic

3. Sexually reproducing organisms produce offspring with marked, significant and visible variation. Asexually reproducing offspring show minor variations.
   i) Do you agree with the above statements?
   ii) Among the following organisms point out the asexually reproducing organism.

   (Cockroach, Euglena, Earthworm and Bird)
10th Science Two Mark Questions Way to Success

Ans: i) Yes    ii) Euglena.

4. **Here are certain important hereditary jargons. Fill in the blanks by choosing a suitable one from the list given.** (allele, variation, speciation, gene, allelomorphs)
   i) _________ are the factors which form the physical basis of inheritance.
   ii) _________ is the alternate forms of the same gene.
   iii) _________ are the expressions of contrasting pairs of alleles.  

[Jun-2013, 2016, Mar-2016, Sep-2016]

Ans: i) Genes   ii) Allele   iii) Allelomorph

5. **A change that affects the body cell is not inherited. However, a change in the gamete is inherited. The effects of radiation at Hiroshima have been affecting generations. Analyze the above statements and give your interpretation.**

Ans:
1. The effects of radiation at Hiroshima have affected the male and female gametes
2. This change in gamete is inheritable and thus affects generations.

6. **Sequentially arrange the different species of man from primitive to modern man.**  
   (Neanderthal man, Homo habilis, Homo erectus, Homo sapiens)  

[Sep-2013, Jun-14, 15, 2016]

Ans: Homo habilis → Homo erectus → Neanderthal man → Homo sapiens

7. **Biotechnology, the modern science in biology, has helped in producing different types of products.**  
   One of the following groups does not have a product of biotechnology. Pick out and give reasons.
   i) enzymes, organic acids, steroids, vaccines
   ii) vaccines, enzymes, antibiotics, inorganic acids
   iii) antibiotics, hormones, steroids, vaccines
   iv) steroids, enzymes, antibodies, vaccines.

Ans: ii) vaccines, enzymes, antibiotics, inorganic acids  
(Reason: Inorganic acids are not the products of bio-technology. They are derived from rocks and minerals)

8. **What do you mean by phenotype and genotype of an individual? Explain.**
   1. Expression of morphological characters is called Phenotype. E.g. tall or dwarf plant, violet or white flower
   2. Genetic makeup of an individual for a particular trait is called Genotype. E.g. TT, Tt, tt

9. **What are variations? Mention their types.**  
   [Mar-2016]
   Variation is defined as the differences in the characteristics among the individuals of the same species (intra specific variation) or among the different genera (inter generic variation) or different species (Inter specific Variation).

   Types of variation:
   a. **Somatic Variation:** It pertains to body cells and it is not inherited.
   b. **Germinal Variation:** It pertains to germ cells or gametes and it is inheritable.

10. **Who proposed the theory of Natural Selection? Mention the two principles of this theory.**
   Charles Darwin proposed the theory of Natural Selection.
   **Principles of this theory:**
   1. Struggle for existence
   2. Survival of the fittest.

11. **What are monoclonal antibodies? Mention its use.**  
    [Sep-2016]
    1. Monoclonal antibodies are the antibodies produced from cloned cells by hybridoma technology.
    2. Monoclonal antibodies are used in treatment of cancer.

12. **What is a clone? In what way is the cloning technique useful in the field of veterinary science?**
    1. A clone is defined as an exact carbon copy of a single genetical parent. The word 'clone' refers only to living species.
2. If the cloning technique is applied to veterinary science, valuable animals could be cloned from
desirable adult cells.

13. In dogs, the barking trait is dominant over the silent trait. Using Punnet Square, work out the
possible puppies born to two barking parents with genotype (Rr).

<table>
<thead>
<tr>
<th></th>
<th>R</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>RR</td>
<td>Rr</td>
</tr>
<tr>
<td>r</td>
<td>Rr</td>
<td>rr</td>
</tr>
</tbody>
</table>

Phenotypic ratio = 3 : 1
Genotypic ratio = 1 : 2 : 1
So 3 dogs are barking, 1 is silent.

14. In Dr. Ian Wilmut’s cloning experiment, did the new born 'Dolly' resemble the udder cell donor
Dorset white sheep or the surrogate mother sheep? Give reasons.
1. The new born 'Dolly' resembled the udder cell donor Dorset white sheep.
2. The scientists used the nucleus of udder cell from Finn Dorset white sheep. The nucleus of the
udder cell contains, diploid number (2n) of chromosomes with all the genes. The ovum was
enucleated and injected with udder cell nucleus. This ovum was developed into ‘Dolly’. So, Dolly
has the same DNA sequence as that of Dorset white sheep and hence the new born 'Dolly'
resembled Dorset white sheep.

15. The excessive use of pesticides has only resulted in the occurrence of more resistant varieties of
pests rather than their complete eradication. How can you link this with Darwin’s theory of
Natural Selection and Evolution?
1. When pesticides are used in excess, the pest species get used to it and become resistant to it which is
a trait developed by them in their struggle for existence and trying to survive.
2. Only these resistant individuals reproduce, passing on their resistance to their offspring. Through
this process of natural selection, the pest population gradually develops resistance to the pesticide.
In each generation the percentage of insecticide resistant individuals increases.

16. The first clinical gene therapy was given in 1990 to a four year old girl suffering from Adenosine
Deaminase Deficiency (ADA). Could you suggest a possible cure for such a disorder with the
knowledge of gene therapy and its types?
1. Yes, I can suggest a possible cure for the disorder
2. ADA deficiency might be treated by i) somatic gene therapy or ii) germline gene therapy. The
defective gene in the somatic cells is replaced with corrective gene. When the the defective gene is
corrected with new gene, the genetic defect developed is rectified and cured.

17. Find the unmatched pairs:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nif genes</td>
<td>Nitrogen Fixation</td>
</tr>
<tr>
<td>tt</td>
<td>Alleles</td>
</tr>
<tr>
<td>Biochips</td>
<td>Biological computer manufacturing</td>
</tr>
<tr>
<td>Interferon</td>
<td>Antiproteins of Bacteria</td>
</tr>
<tr>
<td>stem cells</td>
<td>Unspecialised mass of cells</td>
</tr>
</tbody>
</table>

Ans: The unmatched pair is: Interferon - Antiprotein of Bacteria
Reason: Interferon is an Antiviral protein.

18. For the experimental research Dr.Ian Wilmut used the nucleus of the udder cell from a six year old Finn
Dorset white sheep and preserved the diploid nucleus (2n). He took an ovum from the ovary of another
sheep. The haploid ovum was removed. The diploid nucleus of the udder cell was injected into the
cytoplasm of the enucleated ovum. Then the diploid nucleus ovum was implanted into the uterus of the
surrogate mother sheep. The diploid ovum developed into a young one, named “Dolly”

i) Why did Wilmut select the udder cell?  ii) Define the terms haploid and diploid.
1. The udder cells is a stem cell which can grow, multiply and can be differentiated into same type of
tissues into which they are implanted. The nucleus of the udder cell contains, diploid number (2n) of
chromosomes with all the genes. So, Wilmut selected the udder cell to produce “Dolly”.

Way2s100@gmail.com - 18 - www.waytosuccess.org
10th Science  Two Mark Questions  Way to Success

2. Haploid cells contain single set of chromosomes (n). Eg: Germ cells
   Diploid cells contain double set of chromosomes (2n) Eg: Somatic cells

19. Match the following by identifying the pair :
   (medicines, fuel, microbes, metabolism, organic acids)
   i) vaccine ii) natural gas iii) citric acid iv) monoclonal antibodies v) vitamins

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Microbes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural gas</td>
<td>Fuel</td>
</tr>
<tr>
<td>Citric acid</td>
<td>Organic acids</td>
</tr>
<tr>
<td>Monoclonal antibodies</td>
<td>Medicine</td>
</tr>
<tr>
<td>Vitamins</td>
<td>Metabolism</td>
</tr>
</tbody>
</table>

[Mar-2016, 17]

20. Mention the dominant and recessive traits observed by Mendel in the garden pea plant with
    respect to the seed and flower.

<table>
<thead>
<tr>
<th>Character</th>
<th>Dominant trait</th>
<th>Recessive trait</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed shape</td>
<td>Round</td>
<td>Wrinkled</td>
</tr>
<tr>
<td>Seed colour</td>
<td>Yellow</td>
<td>Green</td>
</tr>
<tr>
<td>Flower colour</td>
<td>Violet</td>
<td>White</td>
</tr>
<tr>
<td>Flower position</td>
<td>Axial</td>
<td>Terminal</td>
</tr>
</tbody>
</table>

UNIT-2 IMMUNE SYSTEM (PUBLIC QN 1)

1. Marasmus and Kwashiorkar are both protein deficiency defects. Marasmus differs from
   Kwashiorkar in enlarged belly and swelling in the face. Are these symptoms for the above diseases
   correct? If not, correct it.
   [Sep-2013, Mar-2014, Sep-2014, Mar-17]

   Ans: Symptoms of Marasmus disease are not correct.
   
   Symptoms of Marasmus:
   The child loses weight and suffers severe diarrhoea and it will appear as though bones are covered by
   the skin.
   
   Symptoms of Kwashiorkar:
   The child develops an enlarged belly with swelling in the face and feet.

2. A list of disorders are given below. Pick out the odd one out and give reasons.
   (Thalassemia, haemophilia, night blindness, albinism, sickle cell anaemia)
   [June-2014, June-2015]

   Ans: Odd one : night blindness
   Reason: Night blindness is a vitamin deficiency disease (Vitamin-A). The remaining diseases are
   hereditary diseases.

3. What are the symptoms of common cold?
   i) ---------------------------  ii) ---------------------------
   [Mar-2013, Mar-2016]

   Ans: i) Flow of mucous, water  ii) Headache, slight rise in temperature

4. Differentiate between the diseases-night blindness and colour blindness.

<table>
<thead>
<tr>
<th>No.</th>
<th>Night blindness</th>
<th>Colour blindness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>It is a nutritional deficiency disease</td>
<td>It is a hereditary disease</td>
</tr>
<tr>
<td>2</td>
<td>It is caused due to the deficiency of vitamin A</td>
<td>It is caused due to the inheritance of defective gene.</td>
</tr>
<tr>
<td>3</td>
<td>Night blindness is the inability to see well at night or in poor light</td>
<td>Colour blindness refers to the difficulty in seeing difference between some of the colours that other people can easily distinguish</td>
</tr>
</tbody>
</table>

5. After observing dark patches with itching sensation on the skin of a student in a school hostel, the
   warden advises his room mates not to share towels, clothes and combs among themselves. Name
   the disease the student is suffering from and name the causative organisms.
   
   Disease: Ringworm
10th Science

Two Mark Questions

Way to Success

Causative agent: Three different genera of fungi namely, Epidermophyton, Microsporum and Trichophyton.

6. Name the vector host of the malarial parasite. Mention the species of malarial parasite which causes malignant and fatal malaria.

Vector host of the malarial parasite: Female Anopheles mosquito
Species of malarial parasite which causes malignant and fatal malaria: Plasmodium falciparum

7. Name the tests done for the diagnosis and confirmation of AIDS. [Jun-2016, Sep-2016]

Enzyme Linked Immuno Sorbent Assay (ELISA): Diagnosis test
Western Blot: confirmatory test.

8. What is triple antigen? Name the three diseases which can be prevented by using it.

1. Triple antigen is a vaccine which is used against 3 infectious disease in human.
2. It is also known as DPT vaccine.
3. Diseases which can be prevented by using this vaccine:
   Diphtheria, Pertussis, Tetanus

9. Mention the type of immunity acquired by a baby through breast-feeding.

Naturally Passive Acquired Immunity.

10. Study the following statements and state whether they are true or false.

   i) Colour blindness is a genetic disorder, whereas night blindness is a nutritional disorder.
   ii) Pernicious anaemia is a nutritional deficiency disease, whereas sickle cell anaemia is a genetic disease/disorder.
   iii) Administering TT injection to an injured child is related to passive artificial immunity, whereas giving BCG vaccine is active artificial immunity.
   iv) Malaria is a bacterial disease, whereas ring worm is a viral disease.

   Ans: i) True  ii) True  iii) False  (Reason: Both are active artificial immunity)  iv) False  (Reason: Malaria is a Protozoan disease, whereas ring worm is a fungal disease.)

11. Ramya is suffering from bleeding gums and loosening teeth. On diagnosis, it was found to have been caused by vitamin deficiency.

Tell Ramya the vitamin that is lacking in her food --------------, the name of deficiency disease she is suffering from -------------

Ans: Vitamin: Vitamin C  Disease: Scurvy

12. Match B and C with A

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamins</td>
<td>Deficiency diseases</td>
<td>Symptoms</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>Nyctalopia</td>
<td>Night Blindness</td>
</tr>
<tr>
<td>Vitamin B₁</td>
<td>Scurvy</td>
<td>Nervous disorder</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>Rickets</td>
<td>Bleeding gums</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>Haemorrhage</td>
<td>Defective calcification of bones</td>
</tr>
<tr>
<td>Vitamin K</td>
<td>Beri-beri</td>
<td>Profuse loss of blood</td>
</tr>
</tbody>
</table>

Ans:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamins</td>
<td>Deficiency diseases</td>
<td>Symptoms</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>Nyctalopia</td>
<td>Night Blindness</td>
</tr>
<tr>
<td>Vitamin B₁</td>
<td>Beri-beri</td>
<td>Nervous disorder</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>Scurvy</td>
<td>Bleeding gums</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>Rickets</td>
<td>Defective calcification of bones</td>
</tr>
<tr>
<td>Vitamin K</td>
<td>Haemorrhage</td>
<td>Profuse loss of blood</td>
</tr>
</tbody>
</table>
13. A health worker advises the people in a locality not to have tattooing done using common needles and to insist the barber to change the shaving razors/ blades in the salon. Name the dreadful disease, the spreading of which, can be prevented by following these measures. Also mention other preventive measures that can be taken with regard to this disease.

Disease: Acquired Immuno Deficiency Syndrome (AIDS)

Preventive measures:
1. Protected sexual behaviour.
2. Safe sex practices.
3. Screening of blood for HIV before blood transfusion.
4. Usage of disposable syringes in the hospitals.

14. Match the following:

<table>
<thead>
<tr>
<th>List I (Disease)</th>
<th>List II (Symptoms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Amoebiasis</td>
<td>I) Chills and high fever recurring for 3 to 4 days</td>
</tr>
<tr>
<td>B. Tuberculosis</td>
<td>II) Patches on skin and nails with itching sensation</td>
</tr>
<tr>
<td>C. Ringworm</td>
<td>III) Abdominal pain with blood and mucus in stools</td>
</tr>
<tr>
<td>D. Malaria</td>
<td>IV) Persistent cough and loss of body weight</td>
</tr>
</tbody>
</table>

Ans:

<table>
<thead>
<tr>
<th>List I (Disease)</th>
<th>List II (Symptoms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Amoebiasis</td>
<td>III) Abdominal pain with blood and mucus in stools</td>
</tr>
<tr>
<td>B. Tuberculosis</td>
<td>IV) Persistent cough and loss of body weight</td>
</tr>
<tr>
<td>C. Ringworm</td>
<td>II) Patches on skin and nails with itching sensation</td>
</tr>
<tr>
<td>D. Malaria</td>
<td>I) Chills and high fever recurring for 3 to 4 days</td>
</tr>
</tbody>
</table>

15. List out the diseases based on their mode of transmission (water borne, air borne, sexual contact i) cholera ii) typhoid iii) tuberculosis iv) leprosy v) syphilis vi) gonorrhoea vii) pneumonia viii) common cold ix) amoebic dysentery x) AIDS

Ans:

- Water borne diseases: Cholera, Typhoid, Amoebic dysentery
- Air borne diseases: Common cold, Tuberculosis, Leprosy, Pneumonia
- Sexual contact-diseases: AIDS, Syphilis, Gonorrhoea

16. i) Give any three examples for the most infectious diseases in man and their causative agents.
ii) To discover medicine for viral infected diseases like AIDS is more difficult than other diseases. Is the statement true or false? Discuss.

Ans: i)

<table>
<thead>
<tr>
<th>Most infectious diseases</th>
<th>Causative agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB (Tuberculosis)</td>
<td>Mycobacterium tuberculosis</td>
</tr>
<tr>
<td>Malaria</td>
<td>Plasmodium falciparum</td>
</tr>
<tr>
<td>Amoebic dysentery</td>
<td>Entamoeba Histolytica</td>
</tr>
</tbody>
</table>

ii) The statement is true.

Reasons:
1. Viruses live inside our body's cells. They use our body's cells to multiply and produce other viruses like themselves. This makes it difficult to find targets for the drug that would interfere with the virus without also harming the host organism's cells.
2. The major difficulty in developing vaccines and anti-viral drugs is due to viral variation.

17. A student had an attack of measles and recovered from the infection. His science teacher said that he will not get that disease again in his life time. Is it true? Why?

1. Yes, it is true
2. If a person is infected with measles for the first time, the body develops immunity against measles virus. The antibodies produced in the blood remain for a long period and kill the similar pathogens. This called Naturally Active Acquired Immunity.
18. **Name the causative organisms responsible for ring worm in humans? Mention the symptoms of the infection.**

**Causative organisms responsible for ring worm in humans:**
Three different genera of fungi namely, Epidermophyton, Microsporum and Trichophyton.

**Symptoms:**
Fungi can live on the dead cells of epidermis. They can cause superficial infections in skin, hair, nail, etc. form patches and cause itching.

19. **Pick out the odd ones:**
   i) AIDS : Retro virus, lymphocytes, BCG, ELISA
   ii) Bacterial disease : Rabies, cholera, common cold, influenza
   iii) DPT vaccine : Diphtheria, tuberculosis, pertussis, tetanus
   iv) Infective stage of Plasmodium in humans: Sporozoites, merozoites, trophozoites, gametocytes.
   v) Mental dimension : brightness of skin, normal metabolism, no black rings around eyes, knows his capacity.

   **Ans:**
   i) BCG
   ii) cholera
   iii) Tuberculosis
   iv) Sporozoites
   v) knows his capacity

20. **In the manufacturing of anti-venom injection against snake bite, antibodies produced in the horse are being used. Mention the type of immunity involved.**

   Artificial Passive Acquired Immunity.

21. **Say whether each of the following diseases is a metabolic disorder, a genetic disorder or a nutritional deficiency disease.**
   i) thalassemia  
   ii) beriberi  
   iii) diabetes mellitus  
   iv) bubble boy syndrome  
   v) scurvy  
   vi) marasmus
   vii) obesity  
   viii) Alzheimer’s disease  
   ix) nyctalopia 
   x) haemophilia

   **Ans:**
   Metabolic disorder
   Diabetes mellitus, Obesity, Alzheimer’s disease
   Genetic disorder
   Thalassemia, Bubble boy syndrome, Haemophilia
   Nutritional deficiency disease
   Beriberi, Scurvy, Marasmus, Nyctalopia

22. **Find the correct statement (True / False):**
   i) Tuberculosis is caused by Mycobacterium tuberculosis bacteria.
   ii) Typhoid is caused by Trichrophyton fungi.
   iii) Malaria is caused by Plasmodium vivax.
   iv) Influenza is caused by Entamoeba histolytica protozoan.

   **Ans:**
   i) True
   ii) False
   iii) True
   iv) False

23. **Malarial fever is not caused in a person immediately after introducing the sporozoites by an infected anopheles mosquito. Why?**

   1. When female Anopheles mosquito bite a healthy person, the sporozoites (the infectious stage) are introduced into his body.
   2. They multiply within the liver cells first and enter the Red Blood Cells(RBC) of man, resulting in the rupture of RBC.
   3. This results in the release of toxic substance called **haemozoin** which is responsible for the chill and high fever, recurring every three to four days.
   4. So, malarial fever is not caused in a person immediately after the entry of sporozoites in a person.

24. **Name the stages of Plasmodium.**

   i) introduced by an infected Anopheles mosquito.
   ii) picked up by Anopheles mosquito from an infected human being.

   **Ans:**
   i) Sporozoites
   ii) Gametocytes

25. **Name two diseases that are transmitted by houseflies. Mention their causative pathogens.**
26. Observe the following flow-chart

![Flow-chart]

Mention the metabolic disorder ‘X’ and the causative factor from the options given below:

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Diabetes insipidus</td>
<td>Deficiency of ADH hormone</td>
</tr>
<tr>
<td>b) Diabetes mellitus</td>
<td>Deficiency of insulin hormone</td>
</tr>
<tr>
<td>c) Coronary heart disease</td>
<td>Blockage of arteries supplying blood to heart muscles</td>
</tr>
<tr>
<td>d) Renal failure</td>
<td>Failure of nephrons to filter the blood</td>
</tr>
</tbody>
</table>

Ans: Metabolic disorder ‘X’ : Diabetes mellitus  
Causative factor : Deficiency of insulin hormone

UNIT-3 STRUCTURE AND FUNCTIONS OF HUMAN BODY ORGAN SYSTEMS (PUBLIC QN 1)

1. Name the two systems which help in the control and co-ordination of metabolic activities. Write any one difference between them.
   Ans:  
i) Nervous system  
ii) Endocrine system

<table>
<thead>
<tr>
<th>Nervous system</th>
<th>Endocrine system</th>
</tr>
</thead>
<tbody>
<tr>
<td>The nervous system provides an organized network of point-to-point connections for quicker coordination.</td>
<td>The endocrine system provides chemical integration through hormones.</td>
</tr>
</tbody>
</table>

2. Differentiate medullated neurons from non-medullated neurons. Where are they found in the nervous system?

<table>
<thead>
<tr>
<th>No.</th>
<th>Medullated neurons (Myelinated neurons)</th>
<th>Non-Medullated neurons (Non-Myelinated neurons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>When the axon of neuron is enclosed by the white fatty myelin cover, it is called Medullated neurons.</td>
<td>The neuron is not enclosed by the myelin sheath.</td>
</tr>
<tr>
<td>2</td>
<td>It is known as white neuron</td>
<td>It is known as grey neuron</td>
</tr>
<tr>
<td>3</td>
<td>It is found in the white matter of the brain</td>
<td>It is found in the grey matter of cerebrum.</td>
</tr>
</tbody>
</table>

3. Name the part of the brain which regulates heart beat and respiration. Where is it located in the brain?
   1. Medulla oblongata  
   2. It is located in the posterior most part of the brain where it merges with the spinal cord.

4. What is corpora quadrigemina? Name the functions associated with it.
   1. The dorsal portion of the midbrain consists of four hemispherical bodies called corpora quadrigemina.  
   2. It controls and regulates various visual reflexes and optical orientation.

5. What are endocrine glands? Name the secretions of these glands. How do these secretions reach the target organs?
   1. The endocrine glands are ductless glands (without ducts) which form the endocrine system.  
   2. They secrete chemical substances called hormones.  
   3. The hormones are carried by the blood from the site of production to the site of action (target organs).
6. Name the following endocrine glands:
   i) The master of endocrine orchestra   ii) The dual gland
   Ans: i) Pituitary gland    ii) Pancreas

7. Which hormone(s) is/are called i) Personality hormone ii) fight, flight and fright hormones?
   Ans: i) Thyroxine    ii) Adrenaline and noradrenalin

8. Name the male and female sex hormones. List out their functions.

<table>
<thead>
<tr>
<th>Male sex hormone</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testosterone (or androgen)</td>
<td>1. It stimulates the growth of reproductive organs and the production of male gametes-the sperm.</td>
</tr>
<tr>
<td></td>
<td>2. It determines the secondary sexual characters in male, such as growth of facial hair, hoarse voice, broadening of shoulder, etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Female sex hormones</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oestrogen</td>
<td>It is responsible for growth of female reproductive organs and the appearance of secondary sexual characters in female, such as growth of pubic hair, soft voice, feminine body, etc.</td>
</tr>
<tr>
<td>Progesterone</td>
<td>It maintains pregnancy and regulates menstrual cycle.</td>
</tr>
<tr>
<td>Relaxin</td>
<td>It relaxes the muscles of the pelvic region at the time of childbirth.</td>
</tr>
</tbody>
</table>

9. In which sub-stages of meiosis-I do the following events occur?
   i) pairing of homologous chromosomes   ii) terminalization
   iii) crossing over                      iv) formation of spindle apparatus.
   Ans: i) Zygotene   ii) Diplotene   iii) Pachytene   iv) Diakinesis

10. Copy the diagram and label any two parts in the group given: (cyton, axon, dendron, terminal branches)  
    [June-12, 13, 2016, Sep-12, 2014, Mar-2014]

   ![Diagram of neuron]

   Cyton    Dendron    Axon    Terminal branches

11. The diagram is of the human brain.
    Shade the areas marked A and B in the parts of the brain, corresponding with the function.
    A. Seat of smell   B. Seat of vision
12. **On the basis of the function performed, pick out the right statements.**
   i) Pituitary gland secretes hormones and enzymes.
   ii) Thyroid gland secretes thyroxine and insulin.
   iii) Leydig cells produce testosterone hormone.
   iv) Pancreas produces enzymes and hormones.

   **Ans:** iii) Leydig cells produce testosterone hormone. iv) Pancreas produces enzymes and hormones.

13. **Correct the statements, if they are wrong.**
   i) Alpha cells produce insulin and beta cells produce glucagon.
   ii) Cortisone suppresses the immune response.
   iii) Thymus gland is a lymphoid mass.
   iv) Ovary produces eggs and androgen.

   **Ans:** i) Alpha cells produce glucagon and beta cells produce insulin
   iv) Ovary produces eggs and Oestrogen.
   (Statements ii & iii are correct)

14. **Here are a few statements about the endocrine system in man. State whether each of them is true or false. If the statement is false write the correct statement.**
   i) Endocrine system controls and co-ordinates the physical process of growth, reproduction and sustenance of life.
   ii) Endocrine glands are duct bearing glands which secrete chemical substances called hormones.
   iii) The pancreas is a dual gland.
   iv) Malfunctioning of the thymus gland causes goitre.

   **Ans:**
   i) True
   ii) False  **(Correct statement:** Endocrine glands are ductless glands which secrete chemical substances called hormones.)
   iii) True
   iv) False  **(Correct statement:** Malfunctioning of the thyroid gland causes goitre.)

15. **Copy and complete the following table:**

<table>
<thead>
<tr>
<th>No.</th>
<th>Hormones of adenohypophysis</th>
<th>Functions and malfunctions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>somatotropic or growth hormone (STH or GH)</td>
<td>It stimulates the growth of thyroid gland and produces thyroxine</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   **Ans:**
<table>
<thead>
<tr>
<th>No.</th>
<th>Hormones of adenohypophysis</th>
<th>Functions and malfunctions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>somatotropic or growth</td>
<td><strong>Function:</strong> It contributes growth in general.</td>
</tr>
</tbody>
</table>
16. **Copy the diagram and label the parts with the help of the clues given:**
   i) It is otherwise called supra renal gland.
   ii) It secretes two hormones, namely aldosterone and cortisone.

   **Ans:**

   ![Diagram](image)

   (i) Adrenal gland
   (ii) Adrenal cortex

17. **Copy and identify the types of neurons given below:**

   **Ans:**

   ![Types of Neurons]

   Unipolar neuron  Bipolar neuron  Multipolar neuron

18. **Here are some statements about meiosis. State whether each of them is true or false:**
   i) It takes place in somatic cells.
   ii) Meiosis is also called reduction division.
   iii) Pairing of homologous chromosomes is called crossing over.
   iv) Meiosis leads to variations which form the raw material for evolution.

   **Ans:**

   i) False  ii) True  iii) False  iv) True

19. **Match the following:**

   | A. leptotene | I. nuclear membrane and nucleolus disappear |
   | B. zygotene | II. terminalization |
   | C. diplotene | III. pairing, synapsis, bivalents |
   | D. diakinesis | IV. chromosomes condense and appear like threads |

   **Answers**

   A - IV. chromosomes .......
   B - III. pairing, synapsis, .....  
   C - II. terminalization  
   D - I. nuclear membrane .....  

20. A person was riding a two-wheeler without wearing a helmet. He met with an accident and sustained a head injury. He was dead before he was shifted to the hospital and it was found that...
his death was due to breathlessness and heart failure. Which part of his brain might have been damaged? Justify your answer.

1. The posterior most part of the brain known as medulla oblongata might have been damaged.
2. Medulla oblongata is the centre for several reflexes involved in the regulation of heart beat, blood vessel contraction, breathing, etc.

21. Match the following:

<table>
<thead>
<tr>
<th>List I</th>
<th>List II</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Vasopressin</td>
<td>I. Resist infection</td>
<td>II. Diabetes insipidus</td>
</tr>
<tr>
<td>B. Insulin</td>
<td>II. Diabetes insipidus</td>
<td>III. Diabetes mellitus</td>
</tr>
<tr>
<td>C. Oxytocin</td>
<td>III. Diabetes mellitus</td>
<td>IV. contraction and relaxation of uterus</td>
</tr>
<tr>
<td>D. Thymosin</td>
<td>IV. contraction and relaxation of uterus</td>
<td>I. Resist infection</td>
</tr>
</tbody>
</table>

22. Observe the following diagrams that depict the transmission of nerve impulses through two pathways from body parts to CNS:

If all the nerves at both the places are similar in thickness and structure, through which pathway will the transmission of an impulse (of same threshold) be faster and why?

Ans:
1. The transmission of nerve impulse through pathway ‘P’ is faster.
2. When the electrical impulse traverse through a neuron and reach the synaptic knob, neurotransmitters are produced which help to pass on the impulse to the adjacent neuron. This process continues till the impulse reaches the CNS.
3. Since the pathway ‘P’ involves less number of neurons, the time taken for passing of impulses and release of neurotransmitters is less.
4. So, the impulse will reach CNS faster through pathway ‘P’.

23. Which gland is called the ‘dual gland’? Why?

1. Pancreas is called the ‘dual gland’ because it plays a dual role both as an exocrine and an endocrine gland.
2. The exocrine portion produces enzyme and endocrine portion produces two hormones such as insulin and glucagon.

24. A 16 year old boy was brought to a doctor with a complaint of non-masculine features (lack of moustache / beard / gruff voice / broadening of shoulders etc). After keen examination, the doctor found that it was a hormonal disorder and the endocrine glands responsible were not functioning properly. Mention the glands and the hormone lacking in the boy.

Endocrine gland: Testes
Hormone: Testosterone

UNIT-4 REPRODUCTION IN PLANTS (PUBLIC QN 1)

1. Write any two differences between asexual and sexual modes of reproduction.

<table>
<thead>
<tr>
<th>No</th>
<th>Asexual reproduction</th>
<th>Sexual reproduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New generation is created from a single individual</td>
<td>New generation is created from two individuals, a male and a female</td>
</tr>
<tr>
<td>2</td>
<td>It occurs in lower group of plants</td>
<td>It occurs in higher group of plants</td>
</tr>
<tr>
<td>3</td>
<td>Asexual reproduction takes place by means of spores.</td>
<td>Sexual reproduction takes place by means of two gametes (male and female) which are fused to produce offspring of their own kind</td>
</tr>
</tbody>
</table>

2. What is vegetative propagation? Mention the vegetative propagules in:
i) Bryophyllum  ii) Spirogyra
Vegetative propagation is the ability of plants to reproduce by bringing forth new plants from existing vegetative structures without sexual reproduction.

i) Vegetative propagules in Bryophyllum: budding
ii) Vegetative propagules in Spirogyra: Fragmentation

3. **Arrange the following events of sexual reproduction in plants in the correct sequential order**: seed formation, pollination, dispersal of seeds, fertilization.
   **Ans:** i) Pollination  ii) Fertilization  iii) Seed formation  iv) Dispersal of seeds

4. **Define pollination**
The transfer of pollen grains from the anther to stigma of a flower is called pollination.

5. **Define fertilization**
The fusion of a male gamete with a female gamete (egg) is known as fertilization.

6. **Name the agents of pollination in the following cases:**
i) Bright coloured flowers with scent and nectar glands.
ii) No colour / scent/ nectar but pollen grains are dry, light weight and powdery. Stigma is feathery.
   Also mention the plants in cases (i) & (ii).
   **Ans:**
   i) Agents of pollination: Insects like butterflies and honey bees (Entamophily)
      Example: Clitoria, Jasmine
   ii) Agent of pollination: Wind
      Example: Grass, pine, maize (Anemophily)

7. **Name the events (i) & (ii) and mention the nature of the nuclear structures formed at the end in the following cases:**
   (i) male gamete (n) + egg (n) = Zygote (2n)
   (ii) male gamete (n) + secondary nucleus (2n) = Endosperm nucleus (3n).
   **Ans:**
   i) Event: Fertilization
      Nature of the nuclear structure formed: Diploid (2n)
   ii) Event: Triple fusion
      Nature of the nuclear structure formed: Triploid (3n)

8. **Differentiate dehiscent fruits and indehiscent fruits with suitable examples.**

<table>
<thead>
<tr>
<th>No</th>
<th>Dehiscent fruits</th>
<th>Indehiscent fruits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>These fruits split open at maturity to disperse the seeds.</td>
<td>These fruits do not split open at maturity and the seeds are liberated by the decaying of pericarp.</td>
</tr>
<tr>
<td></td>
<td>Pea, Bean</td>
<td>Paddy, Cashew nut</td>
</tr>
</tbody>
</table>

9. **What are monocotyledons and dicotyledons? Give examples.**
   1. **Monocotyledons:** Seeds with one cotyledon e.g. maize, rice, wheat and onion.
   2. **Dicotyledons:** Seeds with two cotyledons e.g. pea, bean and castor.

10. **Give suitable terms for the following methods of seed / fruit dispersal, with one example each:**
   (i) by wind (ii) by water (iii) by animals.
   - Seed dispersal by wind: - Anemochory - Calotropis (Erukkum), Moringa (Drum sticks), Tridax
   - Seed dispersal by water: - Hydrochory - Coconut, Lotus
   - Seed dispersal by animals: - Zoochory - Xanthium, Achyranthus

11. **Give any two examples for each of the following cases where dispersal of fruits and seeds take place:**
    (i) by birds (through excreta) (ii) by human beings
    i) **By birds:** Tomato, Guava  
    i) **By human beings:** Cinchona, Rubber and Eucalyptus

12. **What is double fertilization?**
The process of fusion of a male gamete with an egg and the other male gamete with a secondary nucleus is known as double fertilization.

13. **What is triple fusion?**
The fusion of the secondary nucleus with the second male gamete is known as triple fusion.

14. **a. Identify Fig. A and B.**
   **b. Which part of A is modified into B.**  
   
   **Ans:**
   a) \( A = \text{Gynoecium} \) (Female reproductive part of the flower)  
   \( B = \text{Fruit} \)
   b) Ovary is modified into fruit

15. **The methods of reproduction and the organisms are given below. Match the type of reproduction with the suitable organism.**

   **Ans:**

<table>
<thead>
<tr>
<th>Method</th>
<th>Organism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fission</td>
<td>Spirogyra</td>
</tr>
<tr>
<td>Budding</td>
<td>Protozoans</td>
</tr>
<tr>
<td>Fragmentation</td>
<td>Bryophyllum</td>
</tr>
<tr>
<td></td>
<td>Yeast</td>
</tr>
<tr>
<td></td>
<td>Flatworms</td>
</tr>
<tr>
<td></td>
<td>Bacteria</td>
</tr>
</tbody>
</table>

16. **i) Composite fruits are formed by all the flowers of \__________\**
   **ii) \__________\ fruit is developed from a single flower with a multicarpellary apocarpous superior ovary.**
   
   **Ans:**
   i) whole inflorescence  
   ii) Aggregate

17. **Draw the given diagram and label the following parts:**
   **i) Exine**  
   **ii) Tube nucleus.**
   
   **Ans:**

18. **Match the following with respect to dispersal of fruits / seeds:**

   **Ans:**
   a) Autochory  
   b) Anemochory  
   c) Hydrochory  
   d) Zoochory

<table>
<thead>
<tr>
<th>Method</th>
<th>Organism</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) Lotus</td>
<td>- Balsam</td>
</tr>
<tr>
<td>II) Xanthium</td>
<td>- Tridax</td>
</tr>
<tr>
<td>III) Tridax</td>
<td>- Lotus</td>
</tr>
<tr>
<td>IV) Balsam</td>
<td>- Xanthium</td>
</tr>
</tbody>
</table>

19. **Use words from the given list to complete the following paragraph. (The words may be used once / more than once / not at all).**
   (seed, fruit, pollination, dispersal, germination, fertilization, flower, reproduction)
   Ramu went to the field along with his father. He sowed mustard seeds in the soil. After a few days he observed the process of \__________\ The seeds grew into plants and produced \__________\ On maturity, these flowers produced pollen grains that were transferred to the stigma by \__________\ The male gametes fused with the female gametes during the process of \__________

**Ans:**
Ramu went to the field along with his father. He sowed mustard seeds in the soil. After a few days he observed the process of **germination**. The seeds grew into plants and produced **flowers**. On maturity, these flowers produced pollen grains that were transferred to the stigma by **pollination**. The male gametes fused with the female gametes during the process of **fertilization**.

20. Coconut seeds are dispersed by **Hydrochory** (dispersal by water). Mention the part of the fruit whose modification help in this mechanism.

1. The mesocarp of coconut is fibrous and is easily carried by water currents.
2. The fibrous mesocarp of coconut fruit is the modification for hydrochory

**UNIT-5 A REPRESENTATIVE STUDY OF MAMMALS (PUBLIC QN 3)**

1. Mention the two unique characteristics of mammals.
   **Ans:** 1. Epidermal Hair 2. Milk producing glands

2. Give two examples each: i) ruminating mammals ii) marine mammals
   i) ruminating mammals: Cow, Goat
   ii) marine mammals: Whale, Dolphin

3. What type of dentition is seen in mammals? What are elephant tusks?  
   **[Jun-2016]**
   1. Mammals have heterodont dentition.
   2. The tusks of elephants are modified incisors.

4. Mention any four adaptations seen in the camel so that it can live successfully in deserts **[Mar-17]**
   1. Doubly thick skin.
   2. Water-storing osmotic cells.
   3. Thick bushy eyebrows.
   4. Their nostrils can be closed during desert storms.

5. What is echo location? Give an example.
   1. Production of sounds and detection of the echo is known as echo location.
   2. The nocturnal bat can fly without crashing into things and still capture insects by echo location. As a bat flies, it emits a rapid series of extremely high pitched clicking sounds. The sound waves bounce off objects or flying insects and the bat hears the echo.

6. Mention the various valves and their location in the human heart.

<table>
<thead>
<tr>
<th>Valves</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tricuspid valve</td>
<td>Right auriculo ventricular aperture</td>
</tr>
<tr>
<td>Bicuspid valve</td>
<td>or mitral valve</td>
</tr>
<tr>
<td>Semi-lunar valve</td>
<td>Base of the pulmonary artery</td>
</tr>
<tr>
<td>Aortic valve</td>
<td>Base of the aorta</td>
</tr>
</tbody>
</table>

7. Write any four differences between arteries and veins in mammals.

<table>
<thead>
<tr>
<th>No</th>
<th>Arteries</th>
<th>Veins</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arteries carry the blood from the heart to different parts of the body</td>
<td>Veins carry the blood from different parts of the body to the heart.</td>
</tr>
<tr>
<td>2</td>
<td>Except pulmonary artery all other arteries carry oxygenated blood</td>
<td>Except the pulmonary veins all other veins carry deoxygenated blood.</td>
</tr>
<tr>
<td>3</td>
<td>Pulse is detectable in arteries</td>
<td>Pulse is not detectable in veins</td>
</tr>
<tr>
<td>4</td>
<td>Arteries possess thick walls</td>
<td>Veins possess thin walls</td>
</tr>
<tr>
<td>5</td>
<td>Arteries do not possess valves except in the aorta</td>
<td>Veins have valves to prevent back flow of blood</td>
</tr>
</tbody>
</table>

8. Name the three important blood proteins seen in plasma. Add a note on their functions.  
   **[Mar-16, Jun-16]**

<table>
<thead>
<tr>
<th>No</th>
<th>Blood proteins</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Globulin</td>
<td>For Immunity</td>
</tr>
</tbody>
</table>
9. Which blood cells are without nuclei? What is the advantage of this condition?
   1. Matured Red blood cells (RBC) are without nuclei.
   2. **Advantage:**
      - The space occupied by the nucleus is taken by the haemoglobin molecules.
      - Haemoglobin molecules are concerned with carrying of respiratory gases.
      - They carry oxygen from lungs to all cells of the body.

10. **Name the protein and the blood-cells responsible for the clotting of blood.** [Sep- 2016]
   1. The protein responsible for the clotting of blood: **Fibrinogen**
   2. The blood cells responsible for the clotting of blood: **Blood Platelets-Thrombocytes**

11. **i) What are the structural and functional units of kidney?**
    **ii) Arrange the organs of the human excretory system in the correct order, based on the passage of urine.**

   **Ureter, Urethra, Kidney, Urinary bladder**
   
   i) Nephrons are the structural and functional units of the kidney.
   ii) Kidney → Ureter → Urinary bladder → Urethra

12. **Observe the following flow-chart depicting blood-circulation in mammals.**

   Pick out the correct blood vessels A,B,C,D from the following:

   i) Pulmonary veins ii) Venacava
   iii) Pulmonary artery iv) Aorta

   Among the P,Q,R and S samples, identify the correct match from the following

   a) P & Q = Oxygenated and R& S = Deoxygenated
   b) P & Q = Deoxygenated and R& S = oxygenated
   c) All are Oxygenated
   d) All are Deoxygenated

   **Ans:**
   1. A = Venacava    B = Pulmonary artery    C = Pulmonary veins    D = Aorta
   2. b) P & Q = Deoxygenated and R& S = oxygenated

13. **Study the following passage:**

   Most of the vertebrates have jaws with teeth. The mode of arrangement of teeth on the jaws is called dentition. The various types of teeth seen in mammals are incisors(I) canines (C) premolars (P) and molars (M). They are used for biting, tearing, chewing and grinding respectively. Canines, the tearing teeth are well-developed in carnivores and ill-developed or absent in herbivores.

   Now answer the following questions:

   i) In frogs, all the teeth in the upper jaw look alike, whereas in human beings they are different. The type of dentition in man can be called -----------

   a) Homodont     b) Isodont     c) Heterodont     d) Acrodont

   ii) The dental formula of a mammal is written as ICPM =2023/1023. The teeth missing in it are -------.

   a) incisors     b) canines     c) premolars     d) molars

   **Ans:**
   i) Heterodont     ii) b) Canines

14. **Fill in the empty boxes with suitable answers with respect to the valves of a mammalian heart.**
15. Any change in the lifestyle, the food habits and the body form of an organism in order to make it comfortable in the environment / habitat, is called adaptation. Identify the suitable adaptation given below against each mammal.

i) conservation of body heat in large marine mammals like whale (Jaws are modified into baleen plates / Forelimbs are modified into flippers / Fat is deposited in subcutaneous tissue.)

ii) Locating food source by bats-(Forelimbs are modified into wings / Hanging upside down using legs / Production of sounds and detection of the echo)

Ans:

i) Fat is deposited in subcutaneous tissue

ii) Production of sounds and detection of the echo

16. The Master chemists of our body are the kidneys. Justify.

i) Kidneys filter all chemicals in the body.

ii) Kidneys maintain the chemical composition of blood.

iii) Kidneys eliminate all chemicals absorbed by the body.

iv) Kidneys store the chemicals accumulated in the body. [Jun-13, 14, 2016, Mar-2016, Sep-2016]

Ans: ii) Kidneys maintain the chemical composition of blood.

UNIT-6 LIFE PROCESSES (PUBLIC QN 3)

1. Name the types of vascular tissues in the plant stem which are labelled A and B. [Sep-2016]

Ans:

i) Name A and B

ii) What materials are transported through A?

iii) What materials are transported through B?

iv) How do the materials in A move upwards to the leaves?

Ans:

i) A = Xylem    B = Phloem

ii) Xylem transports water and dissolved minerals.

iii) Phloem transports food and amino acids.
iv) Root pressure and transpiration.

2. **What is nutrition? What type of nutrition is seen in green plants and the majority of animals?**
   1. Nutrition is the process of obtaining energy through consumption of food.
   2. Type of nutrition in green plants: Autotrophic nutrition
      Type of nutrition in animals: Heterotrophic nutrition

3. **Match the methods of nutrition of special organs with suitable examples**
   
   **[June-2012, Mar-2014, Mar-2016]**
   
   Ans:

<table>
<thead>
<tr>
<th>Autotrophs</th>
<th>Mycorrhiza</th>
<th>Cuscutta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parasites</td>
<td>Chlorophyll</td>
<td>Monotropa</td>
</tr>
<tr>
<td>Saprophytes</td>
<td>Haustoria</td>
<td>Hibiscus</td>
</tr>
</tbody>
</table>

4. **Observe the diagram**
   
   **[Mar-13,16,17, Sep-15, 2016]**
   
   i) Mention the type of movements shown in figure A and B
   ii) How does this movement differ from the movement of mimosa?
   
   Ans:
   i) A = Geotropism     B = Phototropism
   ii)

   ![Diagram](image)

<table>
<thead>
<tr>
<th>Movement of A and B (Geotropism &amp; Phototropism)</th>
<th>Movement of Mimosa (Touch-me-not plant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movement is dependent on growth</td>
<td>Movement is independent on growth</td>
</tr>
<tr>
<td>The plants respond to stimuli slowly</td>
<td>Immediate response to stimuli</td>
</tr>
</tbody>
</table>

5. **In the process of anaerobic respiration, -------- is a 6 carbon compound which gets converted into -------- carbon compound called lactic acid.**
   
   **[Sep-2013, Sep-2014]**
   
   Ans: Glucose & 3

6. **Sugar is converted into alcohol. In the above reaction what kind of process takes place? Which micro-organism is involved?**
   
   **[Mar-2012, Jun-13,14, 16, Mar-17]**
   
   1. Anaerobic respiration *(or fermentation)*
   2. Yeast.

7. **In human beings, air enters into the body through -------- and moves into --------In fishes, water enters into the body through ------ and the dissolved oxygen diffuses into------**
   
   **[Jun-15, 2016]**
   

8. **Give two examples of root parasites of plants. Mention the special structures present in them to draw the nutrients from the host plant.**
   
   1. Parasites: Cuscuta and Viscum
   2. Special root; haustoria.

9. **What are saprophytes? Give two examples.**
   
   1. Some plants obtain nutrients from nonliving organic matter. They are called saprophytes.
   2. Eg: Fungi, Bacteria, Monotropa

10. **What is the length of the alimentary canal in human beings? List out the parts of the gastrointestinal tract in the correct sequential order based on the passage of food.**

    1. 9 metres
    2. mouth, buccal cavity, pharynx, oesophagus, stomach, small intestine, large intestine, rectum and anus.
11. **What is respiration? Give a balanced equation for aerobic respiration.** [Mar-2016]

The process of acquiring oxygen through breathing and making it available to cells for the process of the breaking down of organic substances into simpler compounds is called respiration.

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + 2900 \text{ kJ energy}$$

\[ \text{Glucose} \quad \text{ATP} \]

12. **A fish taken out of water cannot survive for a long time. Why?**

1. Fishes take in water through their mouth and force it out through their gills, where the dissolved oxygen is absorbed by the blood.
2. As the gills cannot absorb oxygen from the atmosphere, a fish cannot survive for a long time when it is taken out of water.

13. **What are ammonotelic and ureotelic animals? Give examples.**

1. If the excretory substance of animals is composed mostly of ammonia, then they are called ammonotelic animals. Eg: Fish
2. If the excretory substance of animals is composed mostly of urea, then they are called ureotelic animals. Eg: Mammals

14. **Describe the change that occurs in a touch-me-not plant when it is touched?** [Jun-2016]

1. If we touch the touch-me-not plant at one point, all the leaflets show the folding movement.
2. This indicates that the stimulus at one point is communicated.
3. The folding effect of touch-me-not plant is caused by a change in the turgidity of the leaflets brought about by the movement of water into and out of the parenchymatous cells of the pulvinus or swollen leaf base.

15. **Study the following model with which the transpiration mechanism in plants can be demonstrated**

With which structure of the plant do you compare each of the following?
(i) Sponge (ii) Glass tube filled with water.

**Ans:**

i) Sponge : Leaf

ii) Glass tube filled with water: Xylem of the stem

---

**UNIT-7 CONSERVATION OF ENVIRONMENT (PUBLIC QN 1)**

1. **Classify the following into producers, consumers, decomposers.**
   i) butterfly ii) grass hopper iii) calottes iv) snakes v) shoe flower vi) nitrobacteria

<table>
<thead>
<tr>
<th>Producers</th>
<th>Shoe flower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumers</td>
<td></td>
</tr>
<tr>
<td>Primary consumers</td>
<td>Butterfly, Grass hopper</td>
</tr>
<tr>
<td>Secondary consumers</td>
<td>Calottes</td>
</tr>
<tr>
<td>Tertiary consumers</td>
<td>Snakes</td>
</tr>
<tr>
<td>Decomposers</td>
<td>Nitrobacteria</td>
</tr>
</tbody>
</table>

2. **Living organisms adapt themselves according to their habitat. Match the following:**
   a. fish       Wings       fins
   b. camel     hard skin   hard skin
   c. frog      Fins        hind limbs with web
   d. birds     hind limbs with web wings

3. **Fill in the blanks** [Sep-2016]
   i) Animals give out ----- through respiration.
   ii) In the presence of sunlight, plants prepare ----
4. Bacteria and fungi are responsible for the decay of dead plants and animals. Decaying matter is recycled to grow plants. What do we call this?
Ans: Bio-Geo chemical cycles

5. Fill in the blanks with suitable answers from those given in the brackets.
(harmful, heavy metals, carbon dioxide, sulphur particles)
Generation of waste products which contain Mercury, Uranium, Thorium, Arsenic, and other ----- are ---
--------- to human health and environment. ---------- present in the coal will cause acid rain and the
release of --------- a green house gas, causes climate change and global warming.
Ans: (1) heavy metals (2) harmful (3) Sulphur (4) carbon dioxide

6. Depict a food chain by placing the following organisms in the correct trophic levels:
(snake, grass, eagle, frog, grasshopper)
[June-2014, Mar-16, 17]
Ans: Grass → Grasshopper → Frog → Snake → Eagle
(Producer) (Primary consumer) (Primary carnivores) (Secondary carnivores) (Tertiary carnivores)

7. Show an aquatic food chain using the following organisms.
(Small fish, Phytoplanktons, Kingfisher, Zooplanktons)
Ans: Phytoplanktons → Zooplanktons → Small fish → Kingfisher
(Producer) (Primary consumer) (Secondary consumer) (Tertiary consumer)

8. Observe the following food web:
   i) Find out the wrong statement:
      a) ‘A’ is a producer   b) ‘F’ is a herbivore
      c) ‘H’ is an omnivore  d) ‘I’ is a climax carnivore
   ii) Find out how many food chains are present in the above food web.
Ans: i) Wrong statement : d) ‘I’ is a climax carnivore
     ii) Number of food chains in the given food web = 10

9. Observe the following Bio-geo chemical cycle.
   i) Mention the nutrient in the given cycle. ii) Write the activities from ‘A’ to ‘D’.
Ans: i) Carbon (Carbon dioxide)
     ii) A = Photosynthesis
         B = Respiration
         C = Combustion (burning of fossil fuels)
         D = Decomposition

10. Study the food chain below, correct it and convert it into a pyramid of energy.
Mulberry → Sparrow → Caterpillar → Kite  [Mar-2012, Mar-2013, June-2013, Mar-2015]
Ans:
Mulberry → Caterpillar → Sparrow → Kite
11. **Study the illustration and answer the questions:**

   i) Which line (A or B) represents the flow of energy? Why do you say so? ii) Give an example of a decomposer.

   **Ans:**
   
   i) 1. Line B represents the flow of energy.
       2. Reason: This is because, in an eco system energy is passed from one organism to another in a linear fashion as follows:
          Producers → Herbivores → Carnivores → Decomposers.
   
   ii) Bacteria, Fungi.

12. i) **Name the processes noted as No. 1 and 3.** [Mar-2014]
   ii) **Define process 1.**

   **Ans:**
   
   i) Process 1 : Photosynthesis
       Process 3 : Respiration
       Photosynthesis: The conversion of CO₂ and H₂O into Carbohydrate in the presence of sun and chlorophyll in the green leaves of a plant is known as photosynthesis.

**UNIT-8 WASTE WATER MANAGEMENT (PUBLIC QN 3)**

1. **The bar-graph indicates the prevalence / widespread attack of infectious diseases in two cities A and B. Observe it and answer the questions given below:**

   a. What may be the reason for the disease in city A?
   b. Which city needs more effective system of waste-disposal and cleaning?
   c. How can the disease be controlled in city A?

   **Ans:**
   
   a) Reasons for the disease in city ‘A’:
   1. Poor hygiene 2. Inadequate quantity and quality of drinking water 3. Lack of sanitation facilities 4. Contaminated water 5. Stagnant water which can cause mosquitoes to breed
   
   b) City ‘A’ needs more effective system of waste-disposal and cleaning
   
   c) The disease in city ‘A’ can be controlled by-
   1. Providing adequate sanitation and hygiene facilities
   2. Providing clean drinking water
   3. Ground fogging with disinfectants to control mosquitoes
   4. Removing stagnant water
   5. Providing sufficient toilet facilities.

2. **The pie diagram represents a survey result of infectious diseases in a village during 2008–09. Analyse it and answer the following:**

   i) Which diseases affect the majority of the population?
   ii) How are these diseases transmitted?
   iii) Mention any three measures that can control the other two diseases.

   *[June-2013, Sep-2013, Mar-2014, Sep-2014, Mar-2015]*

   **Ans:**
   
   i) Dengue fever and chikungunya
Two Mark Questions

Way to Success

3. **Match the suitable renewable and non-renewable sources.** [Jun-2012, 14, 16, Sep-14, 16, Mar-14, 17]

<table>
<thead>
<tr>
<th>Sources</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable</td>
<td>Coal</td>
<td>Wind</td>
<td>Petroleum</td>
</tr>
<tr>
<td>Non-renewable</td>
<td>Hydrogen</td>
<td>Natural gas</td>
<td>Solar Energy</td>
</tr>
</tbody>
</table>

Ans:

<table>
<thead>
<tr>
<th>Sources</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable</td>
<td>Hydrogen</td>
<td>Wind</td>
<td>Solar energy</td>
</tr>
<tr>
<td>Non-renewable</td>
<td>Coal</td>
<td>Natural gas</td>
<td>Petroleum</td>
</tr>
</tbody>
</table>

4. **Find the odd one out:** [Mar-12, 13, 2016, Jun-13, 15, 2016, Sep-13, 15, 2016]

i) bio-alcohol, green diesel, bio-ethers, petroleum   
ii) cholera, typhoid, scabies, dysentery

Ans:

i) Petroleum  (Reason: Petroleum is a fossil fuel while others are bio fuels)
ii) Scabies    (Reason: Scabies is a water washed disease while others are water borne diseases)

5. A non-renewable resource is a natural resource, if it is replaced by natural process at a rate equal to or faster than its rate of consumption by humans. Read this statement and say whether it is correct or incorrect. If it is incorrect, give the correct statement. [Mar-2013, June-2014, Mar-2015]

Ans:

This is an incorrect statement.
Correct statement:
A renewable resource is a natural resource if it is replaced by natural process at a rate comparable or faster than its rate of consumption by humans.

6. **Pick out the appliances that can conserve electric energy.** [Jun-12, 13, 15, 2016, Mar-13, 2015]

Florescent bulbs, copper choke, solar water heater, electric water heater, tungsten bulbs, electronic choke.

Ans: Florescent bulbs, solar water heater and electronic choke

---

**TWO MARK QUESTIONS – CHEMISTRY**

**UNIT-9 SOLUTIONS (PUBLIC QN 2)**

1. From the table given below, furnish your points of inferences.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Solubility at 25°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>NaCl</td>
<td>36 g</td>
</tr>
<tr>
<td>NaBr</td>
<td>95 g</td>
</tr>
<tr>
<td>NaI</td>
<td>184 g</td>
</tr>
</tbody>
</table>

1. At 25°C, 36 g of NaCl, 95 g of NaBr and 184 g of NaI dissolves in 100 g water to give saturated solution.
2. Temperature affects the solubility.
3. The given salts are halides of sodium. Size of halogens increase in the order Cl < Br < I. Increase in size decreases the attractive force between the ions and hence solubility is increased.

2. **Distinguish between the saturated and unsaturated solution at a temperature of 25°C using the data given below**  

Note: Solubility of NaCl is 36g
A. 16g NaCl in 100g water  B. 36g NaCl in 100g water  

Ans:  

<table>
<thead>
<tr>
<th>No.</th>
<th>Saturated solution</th>
<th>Unsaturated solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A solution in which no more solute can be dissolved in a definite amount of solvent at a given temperature is called a saturated solution.</td>
<td>A solution in which the solute is in lesser amount in comparison with the solvent is called unsaturated solution. In this, addition of solute is possible till the solution reaches the point of saturation.</td>
</tr>
<tr>
<td>2</td>
<td>No more solute dissolve in it at 25° C</td>
<td>Solute can be dissolved until it reach saturated.</td>
</tr>
<tr>
<td>3</td>
<td>36g NaCl in 100g water at 25°C is a saturated solution</td>
<td>16g NaCl in 100g water at 25°C is unsaturated solution</td>
</tr>
</tbody>
</table>

3. Differentiate true solution and colloidal solution.  

<table>
<thead>
<tr>
<th>Property</th>
<th>True Solution</th>
<th>Colloidal Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particle size</td>
<td>1Å to 10 Å</td>
<td>10Å to 2000 Å</td>
</tr>
<tr>
<td>Appearance</td>
<td>Transparent</td>
<td>Translucent</td>
</tr>
<tr>
<td>Visibility of particles</td>
<td>Not visible even under ultra microscope</td>
<td>Visible Under ultra microscope</td>
</tr>
<tr>
<td>Nature</td>
<td>Homogeneous</td>
<td>Heterogeneous</td>
</tr>
<tr>
<td>Diffusion of particles</td>
<td>diffuses rapidly</td>
<td>diffuses slowly</td>
</tr>
<tr>
<td>Scattering effect</td>
<td>Does not scatter light</td>
<td>It scatters light</td>
</tr>
</tbody>
</table>

4. You have prepared a saturated solution of sugar at room temperature. Is it possible to dissolve some more grams of sugar to this solution? Justify your answer.

1. No, it is not possible in room temperature.
2. Reason: No more solute can be dissolved in a saturated solution at a given temperature. If we try it, the excess sugar will be deposited at the bottom of the water.
3. But if the temperature of the solution is increased, we can dissolve some more amount of sugar.

5. Find the concentration of solution in terms of weight percent if 20 gram of common salt is dissolved in 50 gram of water.  

\[
\text{Weight percent} = \frac{\text{weight of the solute}}{\text{Weight of solute} + \text{Weight of solvent}} \times 100
\]

\[
= \frac{20}{20+50} \times 100 = \frac{20}{70} \times 100 = 28.57 \%
\]

6. Valli took some common salt, naphthalene balls, camphor, baking soda and washing soda. She attempted to dissolve these substances either in water or in acetone. Complete the table with the expected results.

<table>
<thead>
<tr>
<th>SUBSTANCE</th>
<th>MEDIUM IN WHICH IT IS SOLUBLE</th>
<th>REASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Common salt</td>
<td>Water</td>
<td>Common salt is a polar compound and hence it dissolves in water which is a polar solvent.</td>
</tr>
<tr>
<td>b. Naphthalene balls</td>
<td>Acetone</td>
<td>Naphthalene ball is a non polar compound and hence it dissolves in acetone which is a non polar solvent.</td>
</tr>
<tr>
<td>c. Camphor</td>
<td>Acetone</td>
<td>Camphor is a non polar compound and hence it</td>
</tr>
</tbody>
</table>

Way2s100@gmail.com  - 38 -  www.waytosuccess.org
7. i) Which gas is dissolved in soft drinks?  [Mar-2016, Sep-2016]
    ii) What will you do to increase the solubility of this gas?

    Ans:
    i) Carbon dioxide (CO₂)
    ii) Increase the pressure.

8. **Beaker A has sugar mixed with water and Beaker B has starch dissolved in water.**
   i) Which solution will scatter light?
   ii) In which beaker does the Brownian movement take place?
   iii) Name the type of solution that beaker A and beaker B contain.
   iv) Which of the two solutions is homogeneous?
   v) Identify the beaker that has particles of size 10 Å to 2000 Å.

    Ans:
    i) Starch solution (beaker B)
    ii) Beaker B (Starch solution)
    iii) Beaker A = True solution
         Beaker B = Colloidal solution
    iv) Sugar Solution (beaker A)
    v) Beaker B (colloidal solution)

9. **Name the type of solution formed in the following cases:**
   i) 20g of NaCl in 100g of water.
   ii) 36g of NaCl in 100g of water.
   iii) 45g of NaCl in 100g of water at 80°C.
   iv) Sulphur dissolved in CS₂
   v) Nitrogen in soil.

    Ans:
    i) 20g of NaCl in 100g of water
       Unsaturated solution
    ii) 36g of NaCl in 100g of water
       Saturated solution
    iii) 45g of NaCl in 100g of water at 80°C
       Super saturated solution
    iv) Sulphur dissolved in CS₂
       Non-aqueous solution
    v) Nitrogen in soil.
       Saturated solution

10. **Give the dispersed phase and the dispersion medium in each of the following:**
    a. cheese  b. soda water  c. smoke

     Ans:
     | Substance             | Dispersed phase (Solute)     | Dispersion medium (Solvent) |
     |------------------------|-----------------------------|-----------------------------|
     | Cheese                 | Liquid (water)              | Solid (food particles)      |
     | Soda water             | Gas (CO₂)                   | Liquid (water)              |
     | Smoke                  | Solid (dust particle)       | Gas (wind)                  |

11. **Radha prepared a solution which could be separated by filtration.**
   i) Name the type of solution.
   ii) Is the solution transparent or opaque?
   iii) Mention the nature of the solution.
   iv) Mention the size of the solute particle.

    Ans: i) Suspension  ii) Opaque  iii) Heterogeneous  iv) More than 2000 Å

12. **In the given case, Sekar observed that the water turned sweeter after sometime.**

    Explain the reason for the same.
**10\textsuperscript{th} Science Two Mark Questions**

**Ans:**
1. Sugar solution is an example for true solution.
2. The size of the solute particles in true solution is very small ie. 1 Å to 10 Å.
3. So, sugar solution diffuses rapidly through porous pot into water ie. from higher concentration to lower concentration and turn the water sweeter after sometime.

### 13. Beaker ‘A’ has chalk powder mixed with water and beaker ‘B’ has protein dissolved in water.

i) Which solution shows Brownian movement?
ii) Identify the solution that has particle size greater than 2000 Å.
iii) Which beaker contains colloidal solution?
iv) Mention the size of the particle present in beaker B.
v) Say whether colloidal solution is homogeneous or heterogeneous.

i) Protein Solution (beaker B)  
ii) Solution in beaker A (chalk powder mixed with water)  
iii) Beaker B (protein dissolved in water)  
iv) 10 Å to 2000 Å  
v) Heterogeneous.

### 14. Justify the following statements with an explanation:

i) Solubility of calcium oxide decreases with increase in temperature.

ii) What happens to the solubility in exothermic process with regard to temperature?

iii) In endothermic process, solubility increases with increase in temperature.

iv) At a given temperature, increase in pressure increases the solubility of the gas.

**Ans:**

i) When calcium oxide dissolves in water, exothermic reaction takes place, and so solubility of calcium oxide decreases.

ii) In exothermic process, solubility decreases with increase in temperature.

iii) In endothermic process, solubility increases with increase in temperature.

- Increase of temperature increases the kinetic energy of solvent molecules. So solubility increases.
- The solubility of KNO\textsubscript{3} in water is an endothermic reaction, so solubility increases with increase in temperature

iv) At a given temperature, increase in pressure increases the solubility of the gas.

- At given temperature, increase in pressure increases the solubility of gas according to Henry’s law. e.g. CO\textsubscript{2} in soft drinks

### UNIT-10 ATOMS AND MOLECULES (PUBLIC QN 1)

1. From the given examples, form the pair of isotopes and the pair of isobars:
   \[ ^{18}\text{Ar}^{40}, ^{17}\text{Cl}^{35}, ^{20}\text{Ca}^{40}, ^{17}\text{Cl}^{37} \]

   Isotopes : \( ^{17}\text{Cl}^{35}, ^{17}\text{Cl}^{37} \)  
   Isobars: \( ^{18}\text{Ar}^{40}, ^{20}\text{Ca}^{40} \)

2. Molecular mass of Nitrogen is 28. Its atomic mass is 14. Find the atomicity of Nitrogen.

   \[ \text{Atomicity} = \frac{\text{Molecular mass}}{\text{Atomic mass}} = \frac{28}{14} = 2 \]

   Atomicity of Nitrogen = 2

3. Gram molecular mass of oxygen is 32g. Density of oxygen is 1.429 g/litre. Find the gram molar volume of oxygen.

   \[ \text{Gram molar volume of oxygen} = \frac{\text{Gram molar mass}}{\text{Density of oxygen}} = \frac{32}{1.429} = 22.4 \text{ litre} \]
Gram molar volume of oxygen = 22.4 litre.

4. ‘Cl’ represents Chlorine atom, ‘Cl₂’ represents Chlorine molecule. List out any two differences between atoms and molecules. [June-2015]

<table>
<thead>
<tr>
<th>Atom</th>
<th>Molecule</th>
</tr>
</thead>
<tbody>
<tr>
<td>An atom is the smallest particle of an element</td>
<td>A molecule is the smallest particle of an element or a compound</td>
</tr>
<tr>
<td>An atom is a non bonded entity</td>
<td>A molecule is a bonded entity</td>
</tr>
<tr>
<td>An atom may or may not exist freely</td>
<td>A molecule can exist freely</td>
</tr>
</tbody>
</table>

5. Calculate the gram molecular mass of water from the values of gram atomic mass of Hydrogen and of Oxygen. Gram atomic mass of Hydrogen = 1g, Gram atomic mass of Oxygen = 16g [Mar-2013]

Gram molecular mass of H₂O = 2 (H) + 1 (O) = 2 (1) + 1 (16) = 18 g

Gram molecular mass of H₂O = 18 g

6. One mole of any substance contains $6.023 \times 10^{23}$ particles. If $3.0115 \times 10^{23}$ particles are present in CO₂ find the number of moles.

Number of moles = \(\frac{\text{Number of molecules}}{\text{Avogadro number}}\)

\[= \frac{3.0115 \times 10^{23}}{6.023 \times 10^{23}} = \frac{1}{2} = 0.5 \text{ mole}\]

Number of moles = 0.5 mole

7. ------------------ have equal number of neutrons.

i) Isobars  ii) Isotones  iii) Isotopes  iv) Mass Numbers

Ans: Isotones

8. Classify the following based on atomicity:

i) Chlorine  ii) Neon  iii) Phosphorous  iv) Ozone

Ans: i) Chlorine - Diatomic  ii) Neon – Monoatomic

iii) Phosphorous – Polyatomic  iv) Ozone - Triatomic

9. Identify and correct the mistake in each of the following:

i) The molar volume of gas at STP is 22.4 cm³.

ii) $2 \times \text{R.M.M.} = \text{V.D.}$

iii) An atom cannot exist independently.

iv) The ratio of atoms in a molecule may be integral or simple or may not be fixed.

v) H₂O is a homo atomic molecule.

Ans:

i) The molar volume of gas at STP is 22.4 litre or 22400 cm³

ii) R.M.M. = $2 \times \text{V.D.}$

iii) An atom may or may not exist independently.

iv) The ratio of atoms in a molecule may be fixed and integral but may not be simple.

v) H₂O is a hetero atomic molecule.

10. Give a single term substitute for each of the following:

i) $6.023 \times 10^{23}$ molecules ii) 22.4 litres of gas at STP iii) 1/12th part of the mass of one atom of carbon iv) The half of relative molecular mass v) Molecular mass / atomic mass

Ans:
10th Science Two Mark Questions Way to Success

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>$6.023 \times 10^{23}$ molecules</td>
<td>1 mole</td>
</tr>
<tr>
<td>ii)</td>
<td>22.4 litres of gas at STP</td>
<td>Molar volume</td>
</tr>
<tr>
<td>iii)</td>
<td>1/12th part of the mass of one atom of carbon</td>
<td>1 Atomic mass unit</td>
</tr>
<tr>
<td>iv)</td>
<td>The half of relative molecular mass</td>
<td>Vapour density</td>
</tr>
<tr>
<td>v)</td>
<td>Molecular mass / atomic mass</td>
<td>Atomicity</td>
</tr>
</tbody>
</table>

## UNIT-11 CHEMICAL REACTIONS (PUBLIC QN 2)

1. What type of chemical reaction takes place when i) limestone is heated? ii) a magnesium ribbon is burnt in air?  
   
   i) When limestone is heated decomposition reaction takes place  
   
   $$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$$ 
   
   ii) When a magnesium ribbon is burnt in air combination reaction takes place.  
   
   $$2Mg + O_2 \rightarrow 2MgO$$

2. The pH values of certain familiar substances are given below. Analyse the data in the table and answer the following questions  
   
   ![Table](image.png) 

   i) Which substances are acidic in nature?  
   
   ii) Which substances are basic in nature?  

   Ans: i) Vinegar  
   
   ii) Blood, Baking soda and Household ammonia

3. Why does the colour of copper sulphate change when an iron nail is kept in it? Justify your answer.  
   
   - Iron is more reactive than copper.  
   - So, iron displaces copper from copper sulphate solution  
   - Blue colour of the copper sulphate solution changes into green colour and the iron nail acquires a brownish look.  
   
   $$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$$

4. The hydroxide ion concentration of a solution is $1.0 \times 10^{-8}$ M. What is the pH of the solution?  
   
   $$pOH = -\log_{10} [OH^-]$$  
   
   $$= -\log_{10} (1.0) \times 10^{-8}$$  
   
   $$= -\log_{10} (10^{-8})$$  
   
   $$= -8 - \log_{10} 10$$  
   
   $$= -8 - 1 = 8$$  
   
   $$pOH = 8$$  
   
   $$pH + pOH = 14$$  
   
   $$pH = 14 - pOH$$  
   
   $$pH = 14 - 8 = 6$$  
   
   $$pH = 6$$

5. Equal lengths of magnesium ribbons are taken in test tubes A and B. Hydrochloric acid is added to test tube A, while acetic acid is added to test tube B. The amount and concentration taken for both the acids are same. In which test tube does the reaction occur more vigorously and why?  

   The reaction occurs more vigorously in test tube A  
   
   Reason: Hydrochloric acid is stronger and more reactive than acetic acid.

6. Two acids ‘A’ and ‘B’ were kept in beakers. Acid ‘A’ undergoes partial dissociation in water, whereas acid ‘B’ undergoes complete dissociation in water.  

   i) Of the two acids ‘A’ and ‘B’, which is weak acid and which is strong acid?  
   
   ii) What is a weak acid?  
   iii) What is a strong acid?  
   iv) Give one example each.
7. Observe the given chemical change and answer the following:

\[ \text{Calcium oxide} \xrightarrow{\text{CO}_2} \text{A} \]
\[ \text{B} \xrightarrow{\text{CaCO}_3} \]
\[ \text{HCl} \xrightarrow{\text{C} + \text{D}} \]
\[ \text{E} \xrightarrow{\text{Ca(OH)}_2} \]

i) Identify ‘A’ and ‘B’.
ii) Write the commercial name of calcium hydroxide.
iii) Identify products ‘C’ and ‘D’ , when HCl is allowed to react with calcium oxide.
iv) Say whether calcium oxide is acidic or basic.

Ans:

i) A = CaCO_3  B = CO_2  ii) Slaked lime
iii) C = CaCl_2  D = H_2O  iv) Calcium oxide is basic.

8. Take copper nitrate in a test tube and heat it over the flame.

i) What is the colour of cupric nitrate?  ii) What do you observe?
iii) Name the type of reaction that takes place.  iv) Write the balanced equation.

Ans:

i) Blue  ii) Reddish brown gas is evolved on heating cupric nitrate
iii) Decomposition  iv) \(2\text{Cu(NO}_3\text{)}_2 \rightarrow 2 \text{CuO} + 4\text{NO}_2 + \text{O}_2\)

9. Identify the wrong statements and correct them.

i) Sodium benzoate is used in food preservative.  ii) Nitric acid is not used as fertilizer in agriculture.
iii) Sulphuric acid is called the king of chemicals. iv) The \(p^H\) of acid is greater than 7.
v) Acetic acid is used in aerated drinks.

Ans:

i) Correct statement
ii) Nitric acid is used as fertilizer in agriculture. (Ammonium Nitrate)
iii) Correct statement
iv) The \(p^H\) of acid is less than 7.
v) Carbonic acid is used in aerated drinks.

10. Redox reactions are reactions during which electron transfer takes place. Here magnesium atom transfers two electrons one each to the two chlorine atoms.

i) What are the products of this reaction?  ii) Write the balanced equation for the complete reaction.
iii) Which element is being oxidized?  iv) Which element is being reduced?
v) Write the reduction part of the reaction.

Ans:

i) \(\text{MgCl}_2\)  ii) \(\text{Mg} + \text{Cl}_2 \rightarrow \text{MgCl}_2\)  iii) Mg is oxidized
iv) \(\text{Cl}_2\) is reduced  v) \(\text{Cl}_2 + 2\text{e}^- \rightarrow 2\text{Cl}^-\)

Note: oxidation part of the reaction: \(\text{Mg} \rightarrow \text{Mg}^{2+} + 2\text{e}^-\)

11. Suggest a reason for each observation given below

i) In fireworks, powdered magnesium is used rather than magnesium ribbon.
ii) Zinc and dilute \(\text{H}_2\text{SO}_4\) react much more quickly when a few drops of copper sulphate solutions are added.
iii) The reaction between magnesium carbonate and dilute hydrochloric acid speeds up when some concentrated HCl is added.

Ans:

i) Powdered magnesium offers large surface area for the reaction to occur at a faster rate.
ii) Copper sulphate solution acts as a catalyst. So, it speed up the reaction.
12. **Sodium hydroxide and hydrochloric acid react as shown in this equation.**

\[ \text{NaOH (aq)} + \text{HCl (aq)} \rightarrow \text{NaCl (aq)} + \text{H}_2\text{O (l)} \]

i) Which type of chemical reaction is this?

ii) The reaction is exothermic. Explain what that means.

iii) Differentiate exothermic reaction and endothermic reaction.

iv) What happens to the temperature of the solution as the chemicals react?

**Ans:**

i) Neutralisation reaction

ii) Heat energy is given out during the reaction.

iii) Exothermic reactions - Heat energy is given out. E.g. burning of coal

   Endothermic reactions - Heat energy is absorbed. E.g. glucose dissolved in water.

iv) The temperature of the solution increases as the chemicals react.

13. **Take two conical flasks. Label them as I and II. Take a small amount of copper sulphate solution in the first conical flask. Take a small amount of granulated zinc in the second conical flask. Allow the copper sulphate solution to react with the zinc.**

i) Name the type of reaction.

ii) Say whether the metal zinc is more reactive or less reactive.

iii) Write the complete and balanced reaction.

iv) Say whether this change is reversible or irreversible.

**Ans:**

i) Displacement reaction or Redox reaction

ii) Zinc is more reactive than copper

iii) \[ \text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu} \]

iv) This change is irreversible.

14. **Relate the information given in all the four columns of the table.**

<table>
<thead>
<tr>
<th>Compound</th>
<th>Chemical formula</th>
<th>Chemical name</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Washing soda</td>
<td>CaOCl₂</td>
<td>Calcium sulphate hemihydrate</td>
<td>for making statues</td>
</tr>
<tr>
<td>2. Baking soda</td>
<td>Na₂CO₃</td>
<td>Sodium bicarbonate</td>
<td>softening of hard water</td>
</tr>
<tr>
<td>3. Bleaching powder</td>
<td>CaSO₄ . ½ H₂O</td>
<td>Sodium carbonate</td>
<td>for making cake</td>
</tr>
<tr>
<td>4. Plaster of paris</td>
<td>NaHCO₃</td>
<td>Calcium oxy chloride</td>
<td>bleaching</td>
</tr>
</tbody>
</table>

**Ans:**

<table>
<thead>
<tr>
<th>Compound</th>
<th>Chemical formula</th>
<th>Chemical name</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Washing soda</td>
<td>Na₂CO₃</td>
<td>Sodium carbonate</td>
<td>softening of hard water</td>
</tr>
<tr>
<td>2. Baking soda</td>
<td>NaHCO₃</td>
<td>Sodium bicarbonate</td>
<td>for making cake</td>
</tr>
<tr>
<td>3. Bleaching powder</td>
<td>CaOCl₂</td>
<td>Calcium oxy chloride</td>
<td>bleaching</td>
</tr>
<tr>
<td>4. Plaster of paris</td>
<td>CaSO₄ . ½ H₂O</td>
<td>Calcium sulphate hemihydrate</td>
<td>for making statues</td>
</tr>
</tbody>
</table>

15. **When lead powder is added to copper chloride solution, a displacement reaction occurs and solid copper is formed.** i) Write the equation for the reaction. ii) Why does the displacement reaction occur?

**Ans:**

i) \[ \text{Pb} + \text{CuCl}_2 \rightarrow \text{PbCl}_2 + \text{Cu} \]

ii) Lead is more reactive than copper.

16. **When zinc and copper (II) sulphate are heated together, the following redox reaction occurs:**

\[ \text{Zn (s)} + \text{CuSO}_4 \text{(aq)} \rightarrow \text{ZnSO}_4\text{(aq)} + \text{Cu (s)} \]

i) What does the word redox stand for? ii) Show how electrons are transferred in the reaction.

iii) Write the ionic equation for the redox reaction.

**Ans:**
1. **Redox reaction** is a chemical reaction in which oxidation and reduction take place simultaneously.

   i) **Redox reaction** is a chemical reaction in which oxidation and reduction take place simultaneously.

   ii) Two electrons are transferred from Zn to Cu^{2+}

   Oxidation : Zn(s) \(\rightarrow\) Zn^{2+}(aq) + 2 e^{-}

   Reduction : Cu^{2+}(aq) + 2 e^{-} \(\rightarrow\) Cu(s)

   iii) Zn(s) + Cu^{2+}(aq) \(\rightarrow\) Zn^{2+}(aq) + Cu(s)

17. If a substance gains oxygen during a reaction, it is being oxidized. If it loses oxygen, it is being reduced. Oxidation and Reduction always take place together, so that if one substance is oxidized, another is reduced. Using this idea, say which substance is oxidised and which substance is reduced in each reaction.

   i) Mg(s) + O_{2}(g) \(\rightarrow\) 2MgO(s)

   ii) ZnO + C \(\rightarrow\) Zn + CO

   iii) Fe_{2}O_{3} + 3CO \(\rightarrow\) 2Fe + 3 CO_{2}

   iv) Cr_{2}O_{3} + 2Al \(\rightarrow\) 2Cr + Al_{2}O_{3}

   Ans: i) Mg is oxidized & O_{2} is reduced

   ii) C is oxidized & ZnO is reduced

   iii) CO is oxidized & Fe_{2}O_{3} is reduced

18. The hydrogen ion concentration of a solution is \(1 \times 10^{-8}\) M

   i) What is the pH of the solution? ii) What is the pOH of the solution? iii) Is the given solution, acidic or basic?

   Ans:

   i) \[ \text{pH} = - \log_{10} [H^{+}] = - \log_{10} (1 \times 10^{-8}) = - \log_{10} (10^{-8}) = (-8) \times -\log_{10}10 = -8 \times -1 = 8 \]

   ii) \[ \text{p}^{\text{H}} + \text{p}^{\text{OH}} = 14 \]

   \[ \text{p}^{\text{OH}} = 14 - \text{p}^{\text{H}} = 14 - 8 = 6 \]

   \[ \text{p}^{\text{OH}} = 6 \]

   iii) \(\text{p}^{\text{H}} > 7\). Therefore the given solution is basic.

19. When solutions of silver nitrate and potassium bromide are mixed, a pale yellow precipitate is formed. The ionic equation for the reaction is \(\text{Ag}^{+} + \text{Br}^{-} \rightarrow \text{AgBr}\)

   i) a) What is the name of the pale yellow precipitate? b) Is it soluble or insoluble?

   ii) Is the formation of silver bromide precipitate, a result of redox reaction or not? Justify your answer.

   iii) What is this type of reaction called?

   Ans:

   i) a) Silver bromide b) It is insoluble in water.

   ii) This is not a redox reaction because no oxidation-reduction take place in this reaction.

   iii) This is a double decomposition reaction.

   \[ \text{AgNO}_{3} + \text{KBr} \rightarrow \text{AgBr} + \text{KNO}_{3} \]

   Double Decomposition reaction is the reaction in which exchange of ions between two reactants occurs, leading to the formation of two different products.

UNIT-12 PERIODIC CLASSIFICATION OF ELEMENTS (PUBLIC QN 2)

1. **Assertion**: A greenish layer appears on copper vessels, if left uncleaned.

   **Reason**: It is due to the formation of layer of basic copper carbonate

   Give your correct option.

   a) Assertion and reason are correct and relevant to each other
b) Assertion is true but reason is not relevant to the assertion \[June-2012, Sep-2015, Sep-16, Mar-17\]
\textbf{Ans:} a) assertion and reason are correct and relevant to each other

2. A process employed for the concentration of sulphide ore is …… (froth floatation / gravity separation)
\textbf{Ans:} froth floatation \[Jun-2016\]

3. Coating the surface of iron with other metal prevents it from rusting. If it is coated with a thin layer of Zinc, it is called ……… (galvanization / painting / cathodic protection)
\textbf{Ans:} galvanization

4. Any metal mixed with mercury is called an amalgam. The amalgam used for dental filling is …… (Ag – Sn amalgam / Cu – Sn amalgam) \[Jun-2016\]
\textbf{Ans:} Ag – Sn amalgam

5. \textbf{Assertion:} In thermite welding, aluminium powder and Fe\textsubscript{2}O\textsubscript{3} are used.
\textbf{Reason:} Aluminium powder is a strong reducing agent.
\textbf{Does the reason satisfy the assertion?}
\textbf{Ans:} Yes, the reason satisfies the assertion

6. \textbf{Can the rusting of iron nails occur in distilled water? Justify your answer.} [Mar-12, June-12, June-14]
1. Yes. Rusting of iron nails occurs in distilled water.
2. Distilled water contains dissolved oxygen.
3. So, in the presence of water and oxygen iron nails will rust.

7. \textbf{Iron reacts with con. HCl and con. H\textsubscript{2}SO\textsubscript{4}, but it does not react with con. HNO\textsubscript{3}. Justify your answer with proper reasons.} [Sep-2013, Mar-2015, June-2015]
When iron is dipped in conc. HNO\textsubscript{3} it becomes chemically inert or passive due to the formation of a layer of iron oxide (Fe\textsubscript{2}O\textsubscript{4}) on its surface.

8. \textbf{To design the body of the aircraft aluminium alloys are used. Give reasons.} [Mar-2013, June-2015]
Aluminium alloys are light, have high tensile strength, stronger than aluminium and are corrosion resistant. So, they are used to design the body of the aircraft.

9. \textbf{X is a silvery white metal. X reacts with oxygen to form Y. The same compound is obtained from the metal on reaction with steam with the liberation of hydrogen gas. Identify X and Y.}
X is a silvery white metal. It is aluminium. \[Mar-2012, Jun-2012, Sep-13, 2016\]
\[4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3\]  
\[2\text{Al} + 3\text{H}_2\text{O} \rightarrow \text{Al}_2\text{O}_3 + 3\text{H}_2\]  
\textbf{X} - Aluminium (Al) \hspace{1cm} \textbf{Y} - Aluminium oxide (Al\textsubscript{2}O\textsubscript{3})

10. \textbf{Solve the crossword puzzle:}
\begin{tabular}{cccccccccc}
A & L & K & A & L & I & G & V & K & L \\
L & G & M & N & P & E & R & I & O & D \\
K & O & P & H & A & L & O & G & E & N \\
A & L & P & Q & R & S & U & T & U & E \\
L & D & A & Z & Y & X & P & W & V & O \\
I & O & D & I & N & E & B & C & D & N \\
N & O & B & L & E & G & A & S & E & S \\
E & A & C & T & I & N & I & D & E & S \\
\end{tabular}

\textbf{CLUES:}

<table>
<thead>
<tr>
<th>DOWN</th>
<th>ACROSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. vertical columns are called --------</td>
<td>a. horizontal rows are called --------</td>
</tr>
<tr>
<td>b. second group elements are named as ----- earth metals.</td>
<td>b. first group elements are called --------</td>
</tr>
<tr>
<td>c. an inert gas used in advertisement bulbs.</td>
<td>c. group 17 elements are called --------</td>
</tr>
<tr>
<td>d. a yellowish shining metal weighed in carats.</td>
<td>d. group 18 elements are called --------</td>
</tr>
<tr>
<td>e. belongs to halogen family and helps in thyroid treatment</td>
<td>e. belongs to halogen family and helps in thyroid treatment</td>
</tr>
<tr>
<td>f. inner transition elements present in 7\textsuperscript{th} period</td>
<td>f. inner transition elements present in 7\textsuperscript{th} period</td>
</tr>
</tbody>
</table>

Way2s100@gmail.com - 46 - www.waytosuccess.org
11. Give a single term for each of the following:
   i) The process of extracting ores from the earth’s crust.
   ii) The rocky impurities associated with the ores.
   iii) The substance added to the ore to reduce fusion temperature.
   iv) The process of reducing the roasted oxide ore to metal under molten condition.
   v) Noble metals occur in this state.
   Ans: i) Mining. ii) Gangue or Matrix iii) Flux iv) Smelting v) Native state or Free state

12. Connect the following metallurgical steps with the extraction of metals in the correct order:
   (roasting, bessemerisation, Hall’s process, smelting (reduction), Baeyer’s process, electrolytic refining, blast furnace, calcination, gravity separation, froth floatation process)
   
<table>
<thead>
<tr>
<th>Metal</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
<th>Step 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al</td>
<td>Baeyer’s process</td>
<td>Hall’s process</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu</td>
<td>froth floatation</td>
<td>roasting</td>
<td>smelting</td>
<td>bessemerisation</td>
<td>electrolytic refining</td>
</tr>
<tr>
<td>Fe</td>
<td>gravity separation</td>
<td>roasting</td>
<td>calcination</td>
<td>smelting</td>
<td></td>
</tr>
</tbody>
</table>

   Ans:
<table>
<thead>
<tr>
<th>Metal</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
<th>Step 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al</td>
<td>Baeyer’s process</td>
<td>Hall’s process</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu</td>
<td>froth floatation</td>
<td>roasting</td>
<td>smelting</td>
<td>bessemerisation</td>
<td>electrolytic refining</td>
</tr>
<tr>
<td>Fe</td>
<td>gravity separation</td>
<td>roasting</td>
<td>calcination</td>
<td>smelting</td>
<td></td>
</tr>
</tbody>
</table>

13. Relate all the four columns of the table with unique properties:
   
<table>
<thead>
<tr>
<th>Metal</th>
<th>Ore</th>
<th>Chemical formula</th>
<th>Reduction process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al</td>
<td>haematite</td>
<td>PbS</td>
<td>blast furnace</td>
</tr>
<tr>
<td>Cu</td>
<td>bauxite</td>
<td>Fe$_2$O$_3$</td>
<td>bessemerisation</td>
</tr>
<tr>
<td>Fe</td>
<td>copper pyrite</td>
<td>Al$_2$O$_3$ . 2H$_2$O</td>
<td>froth floatation</td>
</tr>
<tr>
<td>Pb</td>
<td>galena</td>
<td>CuFeS$_2$</td>
<td>Hall’s process</td>
</tr>
</tbody>
</table>

   Ans:
<table>
<thead>
<tr>
<th>Metal</th>
<th>Ore</th>
<th>Chemical formula</th>
<th>Reduction process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al</td>
<td>bauxite</td>
<td>Al$_2$O$_3$ . 2H$_2$O</td>
<td>Hall’s process</td>
</tr>
<tr>
<td>Cu</td>
<td>copper pyrite</td>
<td>CuFeS$_2$</td>
<td>bessemerisation</td>
</tr>
<tr>
<td>Fe</td>
<td>haematite</td>
<td>Fe$_2$O$_3$</td>
<td>blast furnace</td>
</tr>
<tr>
<td>Pb</td>
<td>galena</td>
<td>PbS</td>
<td>froth floatation</td>
</tr>
</tbody>
</table>

14. Here are a few statements related to alloys. Identify the incorrect ones and correct them.
   i) It is a homogenous mixture of metals.
   ii) Zinc amalgam is used in dental filling.
   iii) Duralumin is used for making statues, coins, bells and gongs.
   iv) Alloys are produced by compressing finely divided metals one over the other.
   v) Zinc is the solvent of brass.
   Ans:
   i) Correct statement
   ii) Silver – Tin amalgam is used in dental filling.
   ii) Bronze is used for making statues, coins, bells and gongs.
iv) Correct statement
v) Copper is the solvent of brass.

15. Complete the following table:

<table>
<thead>
<tr>
<th>Zone</th>
<th>Temperature</th>
<th>Chemical process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion zone</td>
<td></td>
<td>CaCO₃ $\rightarrow$ CaO + CO₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CaO + SiO₂ $\rightarrow$ CaSiO₃</td>
</tr>
<tr>
<td></td>
<td>400 ºC</td>
<td></td>
</tr>
</tbody>
</table>

Ans:

<table>
<thead>
<tr>
<th>Zone</th>
<th>Temperature</th>
<th>Chemical process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion zone</td>
<td>1500 ºC</td>
<td>C + O₂ $\overset{1500^\circ C}{\rightarrow}$ CO₂ + heat</td>
</tr>
<tr>
<td>Fusion zone</td>
<td>1000 ºC</td>
<td>CaCO₃ $\overset{1000^\circ C}{\rightarrow}$ CaO + CO₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CaO + SiO₂ $\rightarrow$ CaSiO₃</td>
</tr>
<tr>
<td>Reduction zone</td>
<td>400 ºC</td>
<td>Fe₂O₃ + 3CO $\overset{400^\circ C}{\rightarrow}$ 2Fe + 3CO₂</td>
</tr>
</tbody>
</table>

16. Guess who I am?
i) I am a cheap metal but highly reactive. Therefore, I sacrifice myself to save objects made of iron.
   ii) I am a solid solution. Dentists use me to fill cavities.
   iii) I am a constituent of blood pigment. When I am less in quantity, the person is anaemic.
   iv) I am formed when matrix and flux react.
   Ans: i) Magnesium   ii) Silver – Tin amalgam   iii) Iron   iv) Slag

17. Answer the following questions in one or two sentences:
i) What is the percentage of gold present in ‘Hallmark’ gold?
   ii) What is the meaning of ‘chalcogens’?
   iii) What are the metals used in manufacture of science equipment?
   iv) Name the metal present in chlorophyll which is used in photosynthesis.
   v) When iron is exposed to moist air, a reddish brown substance is deposited on it. What is it? Give its composition.
   Ans: i) 91.6 %   ii) Ore forming elements   iii) Aluminium, Magnesium   iv) Magnesium   v) Hydrated ferric oxide (Rust) Fe₂O₃ · x H₂O

18. Match the following:

<table>
<thead>
<tr>
<th>Type of iron</th>
<th>Percentage of Carbon</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>2 – 4.5 %</td>
<td>making man-hole covers and drain pipes</td>
</tr>
<tr>
<td>Wrought iron</td>
<td>0.25 – 2 %</td>
<td>construction of buildings and machinery</td>
</tr>
<tr>
<td>Pig iron</td>
<td>&lt; 0.25 %</td>
<td>making electromagnets</td>
</tr>
</tbody>
</table>

Ans:

<table>
<thead>
<tr>
<th>Type of iron</th>
<th>Percentage of Carbon</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>0.25 – 2 %</td>
<td>construction of buildings and machinery</td>
</tr>
<tr>
<td>Wrought iron</td>
<td>&lt; 0.25 %</td>
<td>making electromagnets</td>
</tr>
<tr>
<td>Pig iron</td>
<td>2 – 4.5 %</td>
<td>making man-hole covers and drain pipes</td>
</tr>
</tbody>
</table>

UNIT-13 CARBON AND ITS COMPOUNDS (PUBLIC QN 1)

1. Write down the possible isomers and give their IUPAC names using the formula C₄H₁₀. [June 2013]

<table>
<thead>
<tr>
<th>S.No</th>
<th>Isomers</th>
<th>IUPAC Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CH₃-CH₂-CH₂-CH₃</td>
<td>Butane</td>
</tr>
</tbody>
</table>
2. **Diamond is the hardest allotropic of Carbon. Give reason for its hardness.** [Mar-13, 2016, Jun-2016]
   In diamond each carbon atom is bonded to four other carbon atoms in tetrahedral fashion leading to a rigid three dimensional structure, accounting for its hardness and rigidity.

3. **An organic compound (A) is widely used as a preservative in pickles and has a molecular formula C₂H₄O₂. This compound reacts with ethanol to form a sweet smelling compound (B).**
   i) **Identify the compounds A and B.**
   ii) **Name the process and write corresponding chemical equation.** [June-2015, Mar-17]
   i) A: CH₃-COOH, Acetic acid or Ethanoic acid  
      B: CH₃-COOC₂H₅, Ethyl ethanoate
   ii) The process is called esterification.
      
      \[
      \text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \xrightarrow{\text{conc. H}_2\text{SO}_4} \text{CH}_3\text{COO C}_2\text{H}_5 + \text{H}_2\text{O}
      \]
      Ethanoic acid ethanol Ethyl ethanoate

4. **An organic compound (A) of molecular formula C₂H₆O on oxidation with alkaline KMnO₄ solution gives an acid (B) with the same number of carbon atoms. Compound A is used as an antiseptic to sterilize wounds in hospitals. Identify A and B. Write the chemical equation involved in the formation of B from A.**
   i) A: CH₃-CH₂-OH, Ethyl alcohol
      B: CH₃-COOH, Ethanoic acid
   ii) 
      \[
      \text{CH}_3\text{-CH}_2\text{-OH} \xrightarrow{\text{KMnO}_4/\text{OH}^+} \text{CH}_3\text{COOH} + \text{H}_2\text{O}
      \]
      Ethanoic acid

5. **C₂H₆O is the molecular formula for two compounds A and B. They have different structural formula.**
   i) What is this phenomenon known as?
   ii) Give the structural formula of A and B.
   iii) Write down their common and IUPAC names.
   iv) Mention the functional groups of A and B.
   **Ans:**
   i) Isomerism
   ii) A: \( \text{CH}_3\text{-CH}_2\text{-OH} \)  
      B: \( \text{CH}_3\text{-COOH} \)
   iii) | Compound | Structural formula | Common name | IUPAC name |
         |           |                  |             |
         | A         | \( \text{CH}_3\text{-CH}_2\text{-OH} \)  | Ethyl alcohol | Ethanol |
         | B         | \( \text{CH}_3\text{-COOH} \)  | Methoxy methane |
   iv) Functional group of A = -OH (Alcohol)  
       Functional group of B = -O- (Ether)

6. **Rewrite the following choosing the correct word from each pair given in brackets:**
   The hydrocarbons containing at least one carbon to carbon --------- (double/ triple) bond are called -------- (alkenes/alkynes). They have the general formula CₙH₂ₙ. These were previously called ---------
------- (olefins/paraffins). When this compound is treated with ------- (bromine/lime) water, decolourisation occurs because it is --------- (saturated/unsaturated).

Ans: i) double ii) alkenes iii) olefins iv) bromine water v) unsaturated.

7. Identify the compounds using the clues given below:
   i) This is a dark coloured syrupy liquid containing 30% of sucrose.
   ii) During manufacture of ethanol this is added as food for yeast.
   iii) This enzyme converts sucrose into glucose and fructose.
   iv) This compound contains 95.5% ethanol and 4.5% water.
   v) This compound contains 100% pure alcohol.

   Ans: i) Molasses ii) Ammonium sulphate or Ammonium phosphate
        iii) Invertase iv) Rectified spirit v) Absolute alcohol

8. Read each description given below and say whether it fits for ethanol or ethanoic acid.
   i) It is a clear liquid with a burning taste.
   ii) It is used to preserve biological specimens in laboratories.
   iii) It is used to preserve food and fruit juices.
   iv) On cooling, it is frozen to form ice flakes which look like a glacier.

   Ans: i) Ethanol ii) Ethanol iii) Ethanoic acid iv) Ethanoic acid

9. Match these words /sentences with appropriate statements given below:
   (methanol, fermentation, catenation, homologous series, hydrogen gas)
   i) The ability of carbon to form large number of compounds through self linking property.
   ii) Alcohols react with sodium to give this element.
   iii) This series helps in giving knowledge and enables systematic study of members.
   iv) Formation of simple molecules from complex organic compounds using enzymes.
   v) Unlike ethanol, the intake of this compound in very small quantities can cause death.

   | i) The ability of carbon to form large number of compounds through self linking property. | Catenation |
   | ii) Alcohols react with sodium to give this element. | Hydrogen gas |
   | iii) This series helps in giving knowledge and enables systematic study of members. | Homologous series |
   | iv) Formation of simple molecules from complex organic compounds using enzymes. | Fermentation |
   | v) Unlike ethanol, the intake of this compound in very small quantities can cause death. | Methanol |

---

**TWO MARK QUESTIONS - PHYSICS**

**UNIT-14 MEASURING INSTRUMENTS (PUBLIC QN 0)**

Two Mark Questions will not be asked from this lesson.

**UNIT-15 LAWS OF MOTION AND GRAVITATION (PUBLIC QN 2)**

   i) If force = mass x acceleration, then momentum = ---------------
   ii) If liquid hydrogen is for rocket, then --------------- is for MRI.

   Ans: i) Momentum = mass x velocity
   ii) Liquid helium

2. Correct the mistakes, if any, in the following statements.
   i) One newton is the force that produces an acceleration of 1 ms^{-2} in an object of 1 gram mass.

   Ans: i) One newton is the force that produces an acceleration of 1 ms^{-2} in an object of 1 kilogram mass.
   ii) Action and reaction is always acting on two different bodies.
3. **The important use of cryogenics is cryogenic fuels. What do you mean by cryogenic fuels?**

   1. Cryogenic fuels are liquefied gaseous fuels which are kept at extremely low temperatures in order to maintain them in a liquid state.
   2. Cryogenic fuels mainly liquid hydrogen has been used as rocket fuel.
   3. It is used to produce energy at a very low temperature.

4. **As a matter of convention, an anticlockwise moment is taken as ------------- and a clockwise moment is taken as -------------**

   Ans: Positive, Negative

5. **A bullet of mass 20 g moving with a speed of 75 ms$^{-1}$ hits a fixed wooden plank and comes to rest after penetrating a distance of 5 cm. What is the average resistive force exerted by the wooden plank on the bullet?**

   Mass of the bullet, $m = 20 \text{ g} = 20 \times 10^{-3} \text{ kg}$
   Initial velocity of the bullet, $u = 75 \text{ ms}^{-1}$
   Final velocity of the bullet, $v = 0 \text{ ms}^{-1}$
   Distance travelled by the bullet, $s = 5 \text{ cm} = 5 \times 10^{-2} \text{ m}$

   
   
   $v^2 = u^2 + 2as$
   $2as = v^2 - u^2$
   $a = \frac{v^2 - u^2}{2s} = \frac{(0)^2 - (75)^2}{2 \times 5 \times 10^{-2}} = -5625 \text{ ms}^{-2}$

   Force exerted by bullet on the wooden plank, $F_1 = ma = 20 \times 10^{-3} \times (-5625) = -1125 \text{ N}$

6. **A shopping cart has a mass of 65 kg. In order to accelerate the cart by 0.3 ms$^{-2}$ what force would you exert on it?**

   Mass of cart, $m = 65 \text{ kg}$
   Acceleration, $a = 0.3 \text{ ms}^{-2}$

   Force exerted on cart, $F = ma = 65 \times 0.3 = 19.5 \text{ N}$

7. **Why does a spanner have a long handle?**

   A spanner has a long handle because the turning effect of force depends upon the perpendicular distance of the point from the line of action of the force.

   **Turning effect of force = force \times perpendicular distance**

8. **Why does a boxer always move along the direction of the punch of the opponent?**

   1. A boxer always moves along the direction of the punch of the opponent.
   2. In doing so, he increases the time during which the velocity of the moving hand is decreased. Thus, the impact produced by punch due to momentum is also decreased.

9. **The mats used in gyms and the padding used in sports uniforms are made up of soft substances. Why are rigid materials not used?**

   1. In gyms, the person is made to fall on mats made up of soft substances. This is to increase the time of the person’s fall to stop after making the jump. This decreases the rate of change of momentum and hence the force.
   2. Rigid materials stop the body falling on it suddenly then velocity decreases to zero in a very short interval of time. Thus, the rate of change of momentum of the body will be large. So, the impact due to momentum will be very high and that may hurt the person.

10. **Write two principles that are used in rocket propulsion.**

    1. Newton’s third law of motion: “For every action there is an equal and opposite reaction”.
2. The law of conservation of linear momentum: “In the absence of external unbalanced force, the total momentum of a system of objects remains unchanged.”

11. A 10 Kg mass is suspended from a beam 1.2 m long. The beam is fixed to a wall. Find the magnitude and direction (clockwise or anti-clockwise) of the resulting moment at point B.

Mass, \( m = 10 \text{ kg} \)
Distance, \( d = 1.2 \text{ m} \)

\[
\text{Moment} = F \times d = m \times g \times d = 10 \times 9.8 \times 1.2 = 117.6 \text{ Nm}
\]

Magnitude of the resulting moment at point ‘B’ = 117.6 Nm
Direction of moment = Clockwise

12. If the force experienced by a body of unit mass is gravitational field strength, find the gravitational field strength on the surface of the earth.

Mass of the body, \( m = 1 \text{ kg} \) (unit mass)
Mass of Earth, \( M = 5.98 \times 10^{24} \text{ kg} \)
Gravitational constant, \( G = 6.673 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2} \)
Radius of Earth, \( R = 6.38 \times 10^6 \text{ m} \)

\[
F = \frac{G M m}{R^2}
\]

\[
mg = \frac{G M m}{R^2}
\]

\[
1 \times g = \frac{6.673 \times 10^{-11} \times 5.98 \times 10^{24} \times 1}{(6.38 \times 10^6)^2}
\]

\[
g = \frac{9.8}{\text{m s}^{-2}} = 9.8 \text{ Nkg}^{-1}
\]

13. If the density of the earth is doubled to that of its original value, the radius remaining the same, what will be the change in acceleration due to gravity?

Acceleration due to gravity, \( g = \frac{G M}{R^2} \)

Density = \( \frac{\text{Mass}}{\text{Volume}} \)

If the density of the earth is doubled keeping the radius constant, then the mass of earth is also doubled. So, \( g \) becomes,

\[
g = \frac{2 G M}{R^2}
\]

So, acceleration due to gravity will be doubled to that of its original value.

\[
g = 2 \times 9.8 = 19.6 \text{ ms}^{-2}
\]

Acceleration due to gravity \( g = 9.8 \text{ ms}^{-2} \)
If the density of the earth is doubled Acceleration due to gravity \( \text{g}_1 = 2 \times 9.8 = 19.6 \text{ms}^{-2} \)
Change in acceleration due to gravity \( g_1 - g = 19.6 - 9.8 = 9.8 \text{ms}^{-2} \)

14. Renu is standing in a dining line 6.38 \( \times 10^3 \) km from the centre of the earth. The mass of the earth is \( 6 \times 10^{24} \text{ kg} \). i) Find the acceleration due to gravity. ii) Will the value change after she finishes her lunch?

i) Mass of earth, \( M = 6 \times 10^{24} \text{ kg} \)
10th Science

Two Mark Questions

Way to Success

Distance between Renu and centre of earth = 6.38 × 10^3 km
= 6.38 × 10^6 m

Gravitational constant, G = 6.673 × 10^{-11} Nm^2 kg^{-2}

Acceleration due to gravity, g = \frac{GM}{R^2}
= \frac{6.673 \times 10^{-11} \times 6 \times 10^4}{(6.38 \times 10^6)^2}
= 9.8 \text{ ms}^{-2}

ii) The value of g’ is the same for all bodies irrespective of their masses. So, the value of ‘g’ does not change after she finishes her lunch.

15. If an angel visits an asteroid called B 612 which has a radius of 20 m and mass of 104 kg, what will be the acceleration due to gravity in B 612?

Mass of the asteroid, M = 104 kg
Radius of the asteroid, R = 20 m
Gravitational constant, G = 6.673 \times 10^{-11} Nm^2 kg^{-2}

Acceleration due to gravity of the asteroid, g = \frac{GM}{R^2}
= \frac{6.673 \times 10^{-11} \times 104}{(20)^2}
= 1.735 \times 10^{-11} \text{ ms}^{-2} \quad \text{(Negligibly small)}

16. A man of mass ‘m’ standing on a plank of mass ‘M’ which is placed on a smooth horizontal surface, is initially at rest. The man suddenly starts running on the plank with a speed of ‘v’ m/s with respect to the ground. Find the speed of the plank with respect to the ground.

Initial momentum of man = m u
Initial momentum of the plank = M u_2
Total initial momentum = m u + M u_2
Final momentum of man = m v
Final momentum of the plank = M v_2
Total final momentum = m v + M v_2

According to the law of conservation of momentum:

Total initial momentum = Total final momentum
m u + M u_2 = m v + M v_2

Initial velocities of man (u) and plank (u_2) = 0
m (0) + M (0) = m v + M v_2
m v + M v_2 = 0
M v_2 = - mv

\therefore \text{ The speed of the plank with respect to the ground, } v_2 = - \frac{mv}{M}

(Negative sign indicates that plank is moving opposite to the direction of the motion of the man)

17. Two balls of masses in ratio 2:1 are dropped from the same height. Neglecting air resistance, find the ratio of

i) the time taken for them to reach the ground.

Way2s100@gmail.com - 53 -
www.waytosuccess.org
i) the forces acting on them during motion.
ii) their velocities when they strike the ground.
iii) their acceleration when they strike the ground.

i) The ratio of the time taken for them to reach the ground = 1 : 1
ii) The ratio of the forces acting on them during motion = 2 : 1
iii) The ratio of their velocities when they strike the ground = 1 : 1
iv) The ratio of their acceleration when they strike the ground = 1 : 1

18. An object of mass 1 kg is dropped from a height of 20 m. It hits the ground and rebounds with the same speed. Find the change in momentum. (Take g =10 m/s²)

\[ \text{Mass of the object, } m = 1 \text{ kg} \]
\[ \text{Height, } s = 20 \text{ m} \]
\[ \text{Acceleration due to gravity, } g = 10 \text{ ms}^{-2} \]
\[ \text{Initial velocity, } u = 0 \text{ ms}^{-1} \]
\[ \text{Final velocity, } v = ? \]

According to the law of equation of motion,
\[ v^2 = u^2 + 2as \]
\[ v^2 = (0)^2 + 2 \times 10 \times 20 \]
\[ = 400 \]
\[ v = 20 \text{ ms}^{-1} \]

Momentum is a vector quantity i.e. it has both direction and magnitude.
If the initial momentum of the object is \( +p \), then its final momentum must be \( -p \)

Initial momentum = \( mv = (1 \times 20) = 20 \text{ kg ms}^{-1} \)
Final momentum = \( -mv = -(1 \times 20) \)
\[ = -20 \text{ kg ms}^{-1} \]

Change in momentum = Final momentum – Initial momentum
\[ = (-20) – (20) \]
\[ = -40 \text{ kg ms}^{-1} \]

Magnitude of change in momentum = \( 40 \text{ kg ms}^{-1} \)

19. What will be the acceleration due to gravity on the surface of the moon, if its radius is 1/4th the radius of the earth and its mass is 1/80 times the mass of the earth.

Mass of the moon = \( \frac{\text{Mass of earth}}{80} = \frac{M}{80} \)

Radius of the moon = \( \frac{\text{Radius of earth}}{80} = \frac{R}{4} \)

Acceleration due to gravity on the surface of the earth, \( g = \frac{GM}{R^2} \)

Acceleration due to gravity on the surface of the moon,
\[ g (\text{moon}) = \frac{G \times \text{mass of moon}}{(\text{radius of moon})^2} \]
\[ = \frac{G \times \left( \frac{M}{80} \right)}{\left( \frac{R}{4} \right)^2} \]
\[ = \frac{GM}{R^2} \times \frac{16}{80} \]
Acceleration due to gravity on the surface of the moon will be $\frac{1}{5}$th the acceleration due to gravity on the surface of the earth.

20. A boy weighing 20 kg is sitting at one end of a see-saw at a distance of 1.2 m from the centre. Where should a man weighing 60 kg sit on the see-saw, so that it stands balanced?

According to principle of moment,

$$\text{Anticlockwise moment} = \text{Clockwise moment}$$

$$F_1 \times d_1 = F_2 \times d_2$$

$$m_1 g \times d_1 = m_2 g \times d_2$$

$$m_1 \times d_1 = m_2 \times d_2$$

$$60 \times d_1 = 20 \times 1.2$$

$$d_1 = \frac{20 \times 1.2}{60} = 0.4 \text{ m}$$

A man weighing 60 kg should sit at a distance of 0.4 m from the centre of see-saw.

21. A cart driver prods his horse to move forward. The horse refuses to budge and explains: “According to Newton’s III Law, I am pulling the cart, with a certain force and the cart, in turn pulls me back with an equal amount of force. As they are equal in magnitude and act in opposite directions, they cancel each other.”

Do you agree with the explanation given by the horse? Support your answer with proper reasons.

1. No. The explanation given by the horse is not correct.
2. The force that the horse exerts on the cart may be the same as the force that the cart exerts on the horse.
3. When the horse pushes the ground, the ground reacts and exerts a force on the horse in the forward direction. This force is able to overcome friction force of the cart and it moves.
4. So, it is clear that the horse did not apply enough force on the cart and also did not push the ground to overcome the friction force between the cart and the ground.

UNIT-16 ELECTRICITY AND ENERGY (PUBLIC QN 3)

1. Fill in the blanks

i) Potential difference : voltmeter; then current -----------
ii) Hydro power plant : Conventional source of energy; then solar energy --------

Ans: i) ammeter ii) non-conventional source of energy

2. In the list of sources of energy given below, find out the odd one. (wind energy, solar energy, hydro electric power)

Ans: hydro electric power

Reason: hydro electric power is conventional source of energy, while others are non-conventional source of energy

3. Correct the mistakes, if any, in the following statements.

i) A good source of energy would be one which would do a small amount of work per unit volume of mass.
   a) A good source of energy would be one which would do a large amount of work per unit volume of mass.

ii) Any source of energy we use to do work is consumed and can be used again.
   b) Any source of energy we use to do work is consumed and cannot be used again.
4. The schematic diagram, in which different components of the circuit are represented by the symbols conveniently used, is called a circuit diagram. What do you mean by the term components?

**Ans:** Component means element. An element is an electrical device with two terminals to connect it to the other electrical devices.

E.g:
- battery
- electric bulb
- resistance
- key

5. The following graph was plotted between V and I values. What would be the values of V / I ratios when the potential difference is 0.5 V and 1 V?

1) If \( V = 0.5 \), then \( I = 0.2 \)
\[
\frac{V}{I} = \frac{0.5}{0.2} = 2.5 \]

2) If \( V = 1 \), then \( I = 0.4 \)
\[
\frac{V}{I} = \frac{1}{0.4} = 2.5 \, \Omega
\]

Since \( \frac{V}{I} \) is constant, Ohm’s law is verified.

6. We know that \( \gamma \) – rays are harmful radiations emitted by natural radioactive substances.
   i) Which are other radiations from such substances?
   ii) Tabulate the following statements as applicable to each of the above radiations

(They are electromagnetic radiation. They have high penetrating power. They are electrons. They contain neutrons)

a) \( \alpha \) (alpha) and \( \beta \) (beta)
b)

<table>
<thead>
<tr>
<th>Alpha (( \alpha ))</th>
<th>Beta (( \beta ))</th>
<th>Gamma (( \gamma ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>They contain neutrons</td>
<td>They are electrons.</td>
<td>They are electromagnetic radiation. They have high penetrating power.</td>
</tr>
</tbody>
</table>

7. Draw the schematic diagram of an electric circuit consisting of a battery of two cells of 1.5V each, three resistance of 5 ohm, 10 ohm and 15 ohm respectively and a plug key all connected in series.

[June-2013, Sep-2013, Mar-2015]

8. Fuse wire is made up of an alloy of -------- which has high resistance and --------

a) 37% Lead & 63% Tin b) Low melting point

9. Observe the circuit given and find the resistance across AB.

At A side \( R_1, R_2 \) are parrallal.
Let us consider the effective resistance is \( R_{p1} \)
At B side \( R_1, R_2 \) are parrallal.
Let us consider the effective resistance is \( R_{p2} \)
1) For parallel combination of resistors: \[ \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} \]

A) \[ \frac{1}{R_{p1}} = \frac{1}{2} + \frac{1}{1} = 2 \]

B) \[ \frac{1}{R_{p2}} = \frac{1}{1} + \frac{1}{1} = 2 \]

\[ \therefore R_{p1} = \frac{1}{2} \Omega \]

\[ \therefore R_{p2} = \frac{1}{2} \Omega \]

2) For series combination of resistors: \[ R_s = R_{p1} + R_{p2} \]

\[ R_s = \frac{1}{2} + \frac{1}{2} = 1 \Omega \]

Therefore, the total resistance across AB = 1 \Omega

10. Complete the table choosing the right terms from within the brackets.
(zinc, copper, carbon, lead, lead dioxide, aluminium.)

<table>
<thead>
<tr>
<th>+ ve electrode</th>
<th>Lead-acid accumulator</th>
</tr>
</thead>
<tbody>
<tr>
<td>– ve electrode</td>
<td>Leclanche cell</td>
</tr>
</tbody>
</table>

Ans:
<table>
<thead>
<tr>
<th>+ ve electrode</th>
<th>Lead-acid accumulator</th>
<th>Lead dioxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>– ve electrode</td>
<td>Leclanche cell</td>
<td>Zinc</td>
</tr>
</tbody>
</table>

11. How many electrons flow through an electric bulb every second, if the current that passes through the bulb is 1.6 A?

\[ I = 1.6 \text{ A}, \quad t = 1 \text{ sec} \]

Electric charge, \( Q = I \cdot t = 1.6 \times 1 = 1.6 \text{ coulomb} \)

1 coulomb charge contains = \( 6.25 \times 10^{18} \) electrons

\[ \therefore \text{Number of electrons in 1.6 coulomb charge} = 1.6 \times 6.25 \times 10^{18} = 1 \times 10^{19} \text{ electrons} \]

12. Vani’s hair dryer has a resistance of 50 \( \Omega \) when it is first turned on.
   i) How much current does the hair dryer draw from the 230 V – line in Vani’s house?
   ii) What happens to the resistance of the hair dryer when it runs for a long time?

(Hint : As the temperature increases the resistance of the metallic conductor increases.)

i) Current drawn by hair dryer, \( I = \frac{V}{R} \)

\[ = \frac{230}{50} = 4.6 \text{ A} \]

ii) The resistance of the hair dryer will increase when it runs for a long time.

(When the hair dryer runs for a long time more heat is produced according to Joule’s law of heating. \( H = I^2 R t \) (heat produced \( \propto \) time ). The temperature increases the resistance of the hair dryer)

13. In the given network, find the equivalent resistance between A and B.
14. Old – fashioned serial lights were connected in a series across a 240V household line.
i) If a string of these lights consists of 12 bulbs, what is the potential difference across each bulb?
ii) If the bulbs were connected in parallel, what would be the potential difference across each bulb?
i) For series connection, \(V = V_1 + V_2 + \ldots\)

Potential difference across a household line = 240V
Number of bulbs in series = 12

\[\therefore \text{Potential difference across each bulb} = \frac{240}{12} = 20\text{ V}\]

ii) When 12 bulbs are connected in parallel the potential difference across each bulb will be equal to

total voltage of the household line.

So, the potential difference across each bulb = 240 V

15. The figure is a part of a closed circuit. Find the currents \(i_1\), \(i_2\) and \(i_3\).

For parallel connection: \(I = I_1 + I_2 + I_3 + \ldots\)
i) \(i_1 + 2A = 3A\) \(\therefore i_1 = 3A - 2A = 1A\)
ii) \(i_2 + 1A = 3A\) \(\therefore i_2 = 3A - 1A = 2A\)
iii) \(i_3 + 1.5A = i_2\) \(\therefore i_3 + 1.5A = 2A\) \(\therefore i_3 = 2A - 1.5A = 0.5A\)

So, \(i_1 = 1A\) \(i_2 = 2A\) \(i_3 = 0.5A\)

16. If the reading of the Ideal voltmeter (V) in the given circuit is 6V, then find the reading of the ammeter (A).
Potential difference, $V = 6 \text{ V}$
Resistance, $R = 15 \Omega$

Ammeter reading (i.e. Current), $I = \frac{V}{R} = \frac{6}{15} = 0.4 \text{ A}$

17. A wire of resistance $8 \Omega$ is bent into a circle. Find the resistance across the diameter.

- The resistance of the wire = $8 \Omega$
- The wire is bent into a circle.
- A and B are the two opposite points on the wire when bent in circular form. So, the wire is divided into two equal parts and two parts are in parallel.
- Resistance of each part = $\frac{8}{2} = 4 \Omega$
- For parallel combination, $\frac{1}{R_p} = \frac{1}{4} + \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$
  \[ \therefore R_p = 2 \Omega \]

The resistance across the diameter = $2 \Omega$

18. A wire is bent into a circle. The effective resistance across the diameter is $8 \Omega$. Find the resistance of the wire.

- The wire is bent into a circle.
- A and B are the two opposite points on the wire when bent in circular form. So, the wire is divided into two equal parts and two parts are in parallel.
- Resistance of each part = $R$
- The effective resistance across the diameter = $8 \Omega$
- For parallel combination, $\frac{1}{R_p} = \frac{1}{R} + \frac{1}{R}$
  \[ \frac{1}{8} = \frac{1}{R} + \frac{1}{R} \]
  \[ \frac{1}{8} = \frac{2}{R} \]
  \[ R = 8 \times 2 = 16 \Omega \]

Resistance of one part of the wire ($R$) = $16 \Omega$
  \[ \therefore \text{Total resistance of the wire (2R)} = 2 \times 16 = 32 \Omega \]

19. Two bulbs of 40 W and 60 W are connected in series to an external potential difference. Which bulb will glow brighter? Why?

Ans: The 40 W bulb will glow brighter.

Reason:
- Two bulbs of 40 W and 60 W are connected in series. So, current (I) through each bulb is the same,
  \[ P = I^2 R \quad \therefore P \propto R \quad (I = \text{constant}) \]
- Power is directly proportional to resistance.
10th Science Two Mark Questions Way to Success

- According to the equation, \( R = \frac{V^2}{P} \), a 40 W bulb has a higher resistance and it would dissipate more power and hence glow brighter.

20. Two bulbs of 70 W and 50 W are connected in parallel to an external potential difference. Which bulb will glow brighter? Why?

**Ans:** The 70 W bulb will glow brighter.

**Reason:** Two bulbs of 70 W and 50 W are connected in parallel. So, potential difference \( (V) \) across each bulb is the same.

\[
P = \frac{V^2}{R} \quad \therefore \quad P \propto \frac{1}{R} \quad (V = \text{constant})
\]

- Power is inversely proportional to resistance.
- According to the equation, \( R = \frac{V^2}{P} \), a 70 W bulb has a smaller resistance and it would dissipate more power and hence glow brighter.

21. Write about ocean thermal energy. 

[Jun- 2016, Mar-17]

1. The water at the surface of the sea or ocean is heated by the sun while the water in deeper sections is relatively cooler.
2. This difference in temperature is exploited to obtain energy in ocean-thermal-energy conversion plants.
3. These plants can operate if the temperature difference between the water at the surface and water at depths up to 2 kilometers is 293 K (20°C) or more.
4. The warm surface-water is used to boil a volatile liquid like ammonia.
5. The vapours of liquid are then used to run the turbine of a generator.
6. The cold water from the depth of the ocean is pumped up and condenses vapour again to liquid.

22. In a hydroelectric power plant, more electrical power can be generated if water falls from a greater height. Give reasons.

1. Hydro power plants convert the potential energy of falling water into electricity.
2. Potential energy = \( mgh \)
3. Potential energy will be greater if water falls from a greater height \( (h) \).
4. The turbine of generator will be rotated with greater speed and hence more power can be generated.

23. What measures would you suggest to minimize environmental pollution caused by burning of fossil fuel?

2. Promoting afforestation.
3. Installing pollution control equipment to reduce the escape of harmful gases and ashes into the surroundings.
4. Bio fuels such as Bio-diesel and Bio-alcohol can be used as vehicle fuel instead of petroleum.

24. What are the limitations in harnessing wind energy?

1. The output of a single windmill is quite small. Therefore, a number of windmills are erected over a large area of land. So, the initial cost of establishment of wind energy farm is quite high.
2. Wind energy farms can be established only at those places where wind blows for the greater part of a year.
3. The wind speed should be higher than 15 km / h to maintain the required speed of the turbine.
4. There should be some back-up facilities (like storage cells) to take care of the energy needs during a period when there is no wind.
5. Since the tower and blades are exposed to the vagaries of nature like rain, Sun, storm and cyclone, they need a high level of maintenance.

Way2s100@gmail.com - 60 - www.waytosuccess.org
25. **What is bio-mass? What can be done to obtain bio-energy using bio-mass?**

1. Bio-mass is a fuel obtained from plants and animal wastes like wood, cow-dung etc.
2. When wood is burnt in a limited supply of oxygen, water and volatile materials present in it get removed and charcoal is left behind as the residue. Charcoal burns without flames, is comparatively smokeless and has higher heat generation efficiency.
3. Cow-dung, various plant materials like the residue after harvesting the crops, vegetable wastes and sewage are decomposed in the absence of oxygen to give bio-gas.

26. **Which form of energy leads to the least amount of environmental pollution in the process of harnessing and utilization? Justify your answer.**

**Ans:** Solar energy.

**Reasons:**
1. It does not pollute the air by releasing harmful gases.
2. It does not pollute the water by releasing harmful wastes.
3. Solar cells do not make noise and hence there is no noise pollution.
4. Solar cell does not require any fuel for its function and hence no pollutant is released.

---

**UNIT-17 MAGNETIC EFFECT OF ELECTRIC CURRENT AND LIGHT (PUBLIC QN 3)**

1. **Fill in the blanks**
   i) For a motor : a permanent magnet, then for commercial motor : -----------
   ii) Focal length of a lens; metre, then for power of a lens -----------

   **Ans:** i) Electromagnet  
   ii) Dioptre

2. **Correct the mistakes, if any, in the following statements.**
   i) The magnetic field is a quantity that has magnitude only.
   ii) Outside the bar magnet, the magnetic field lines emerge from the South Pole and merge at the North Pole.

   **Ans:**
   i) Magnetic field is a quantity that has **magnitude and direction**.
   ii) Outside the bar magnet, the magnetic field lines emerge from the **North Pole** and merge at the **South Pole**.

3. **The ray diagram shown below is introduced to show how a concave mirror forms the image of an object.**

   i) Identify the mistake and draw the correct ray diagram.
   ii) Write the justifications for your corrections.

   **Ans:**
   i) 
   ![Ray Diagram](image)

   ii) A ray passing through the principal focus of a concave mirror, after reflection, will emerge parallel to the principal axis.

4. **In traffic signals --- colour light is used to stop vehicles because it has --- wave length.**

   **(Hint: scattering of light is inversely proportional to the fourth power of its wavelength)**

   **Ans:** Red, larger

5. **Fill the table with the appropriate words given in bracket.**

   **[Sep-2016]**
(Convex mirror, Plano convex, Concave mirror, Plane mirror, Convex lens, Concave lens)

Ans:

<table>
<thead>
<tr>
<th>Rear side of the vehicle</th>
<th>Erect image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convex mirror</td>
<td>The tooth’s enlarged image</td>
</tr>
<tr>
<td>Concave mirror</td>
<td>The tooth’s enlarged image</td>
</tr>
</tbody>
</table>

6. Write down the names of the specified parts of the human eye.
   i) Dark muscular diaphragm that controls the pupil.
   ii) The screen where the image is formed by the eye lens. [June-2013, Mar-2014, Sep-2014, Mar-2015]
   Ans: i) Iris    ii) Retina

7. You know that myopia is a common refractive defect of vision. A person with this defect can clearly see only objects that are near. Using concave lens of suitable power this defect is corrected.
   i) Mention the other two types of defects.
   ii) Explain how they can be corrected. [June-2013, Mar-2015]
   Ans: 
   i) Hypermetropia or far sightedness and presbyopia
   ii) Hypermetropia can be corrected by using convex lens of suitable power.
       Presbyopia can be corrected by using bifocal lens.

8. Which of the compass needle orientations in the following diagram correctly describes the magnet’s field at that point? [Jun-2016, Sep-2016]
   Ans: Needle ‘a’

   1. No, magnetic monopole does not exist.
   2. Reason: A magnet is made up of large number of molecular magnets. Even if we break or cut the magnet into smaller pieces, each piece will have two poles. Also magnetic lines of force form a closed loop. (magnetic line emerge from north pole and merge at the south pole)

10. A 3 cm tall bulb is placed at a distance of 20 cm from a diverging lens having a focal length of 10.5 cm. Determine the distance of the image.

For diverging lens (concave lens), \( u = -20 \text{ cm} \quad f = -10.5 \text{ cm} \quad v = ? \)

Lens formula:

\[
\frac{1}{f} = \frac{1}{v} - \frac{1}{u}
\]

\[
\therefore \frac{1}{v} = \frac{1}{f} + \frac{1}{u}
\]

\[
\frac{1}{v} = \frac{1}{-10.5} + \frac{1}{-20} = -\left( \frac{1}{10.5} + \frac{1}{20} \right) = -\left( \frac{20+10.5}{210} \right) = -\frac{30.5}{210}
\]

\[
\therefore v = -\frac{210}{30.5} = -6.9 \text{ cm}
\]
12. A ray from medium 1 is refracted below while passing to medium 2. Find the refractive index of the second medium with respect to medium 1.

The refractive index, \( \mu = \frac{\sin i}{\sin r} \)

\[ \mu = \frac{\sin 30^\circ}{\sin 45^\circ} = \frac{1}{\sqrt{2}} = \frac{1}{2} \times \frac{\sqrt{2}}{1} = \frac{1.414}{2} = 0.707 \]

The refractive index of the second medium with respect to first medium = 0.707
So, the 2nd medium is rarer (low density) when it is compared to first medium.

13. A real image, 1/5th the size of the object, is formed at a distance of 18 cm from a mirror. What is the nature of the mirror? Calculate its focal length.

i) Nature of mirror: Concave mirror (Real and inverted image is formed only by concave mirror)

ii) \( v = -18 \text{ cm} \), magnification, \( m = -\frac{1}{5} \) \{ m is –ve for inverted and real image \}

Magnification produced by spherical mirror, \( m = -\frac{v}{u} \)

\[ \therefore \quad -\frac{1}{5} = -\frac{v}{u} \]

\[ \frac{1}{5} = \frac{v}{u} \]

\[ \frac{1}{5} = -18 \]

\[ \frac{1}{u} = -90 \text{ cm} \]

Mirror formula:
\[ \frac{1}{f} = \frac{1}{v} + \frac{1}{u} \]

\[ \frac{1}{f} = \frac{1}{-18} + \frac{1}{-90} = -\left( \frac{1}{18} + \frac{1}{90} \right) = -\left( \frac{5+1}{90} \right) = -\frac{6}{90} = -\frac{1}{15} \]

\[ f = -15 \text{ cm} \]

Focal length = -15 cm

14. A person cannot clearly see objects farther than 12 m from the eye. Name the defect in vision he is suffering from and the lens that should be used to correct this defect. [Jun-2016]

Defect: Myopia or near-sightedness

Lens: Concave lens of suitable power
15. Explain the use of concave mirror as solar concentrators with the help of a ray diagram.
   1. The light from the Sun is converged at a point, as a sharp, bright spot by the concave mirror. This point is the focus of the concave mirror.
   2. Heat is produced due to the concentration of sunlight on the object.
   3. Large concave mirrors are used to focus sun light to produce heat in solar furnaces.

![Concave Mirror Diagram]

16. Light enters from air to kerosene having refractive index of 1.47. What is the speed of light in kerosene, if the speed of light in air is $3 \times 10^8$ m/s?

   Refractive index of kerosene = \frac{\text{Speed of light in air}}{\text{Speed of light in kerosene}}

   \therefore \text{Speed of light in kerosene} = \frac{3 \times 10^8}{1.47}

   \text{Speed of light in kerosene} = 2.04 \times 10^8 \text{ m/s}

17. Murugan trims his beard while looking into a concave mirror whose focal length is 18 cm. He looks into it from a distance of 12 cm.
   i) How far is Murugan’s image from the mirror?
   ii) Does it matter whether or not Murugan’s face is closer or farther than the focal length? Explain.

   i) Concave mirror
   \[ f = -18 \text{ cm} \quad u = -12 \text{ cm} \quad v = ? \]

   Mirror formula:
   \[ \frac{1}{f} = \frac{1}{v} + \frac{1}{u} \]

   \therefore \frac{1}{v} = \frac{1}{f} - \frac{1}{u}

   \frac{1}{v} = \frac{1}{-18} - \frac{1}{-12} = \frac{1}{18} + \frac{1}{12}

   \frac{1}{v} = \frac{1}{12} - \frac{1}{18} = \frac{3}{36} - \frac{2}{36} = \frac{1}{36}

   \text{v} = 36 \text{ cm}

   **Murugan’s image is 36 cm from the mirror**

   ii) When Murugan’s face is held within the focus (closer to focal length) of a concave mirror then an enlarged image of the face is seen in the concave mirror. This helps him in making a smooth shave. On the other hand, if Murugan’s face is farther than the focal length an inverted, real image will be formed. So Murugan’s face will not visible in the mirror.
18. Light travels at $1.90 \times 10^8$ m/s in a crystal, what is the crystal’s index of refraction?

Refractive index of the crystal = \[
\frac{\text{Speed of light in air}}{\text{Speed of light in the crystal}}
\]

Refractive index of the crystal = \[
\frac{3 \times 10^8}{1.90 \times 10^8} = \frac{3}{1.90} = 1.579 \text{ (no unit)}
\]

19. Ranjini makes arrangements for a candle-light dinner and tops it with a dessert of gelatin filled blue berries. If a blueberry that appears at an angle of $45^\circ$ to the normal in air is really located at $30^\circ$ to the normal in gelatin, what is the index of refraction of the gelatin?

Blueberry appears at an angle of $45^\circ$ to the normal in air. So, $\angle i = 45^\circ$

Blueberry is really located at an angle of $30^\circ$ to the normal in gelatin. So, $\angle r = 30^\circ$

Refractive index of gelatin, $\mu = \frac{\sin 45^\circ}{\sin 30^\circ} = \frac{\sqrt{2}}{2} = \frac{2}{\sqrt{2}} = \sqrt{2} = 1.414$

20. If the far point of a myopic person is 75 cm, what should be the focal length of the lens used to rectify this defect?

Defect : Myopia

\[
u = -\infty \text{ (For normal eye)}
\]

\[
v = -75 \text{ cm}
\]

Lens formula:

\[
\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{-75} - \frac{1}{-\infty} = \frac{1}{-75} - 0
\]

\[
f = -75 \text{ cm}
\]

Focal length of the concave lens used to rectify myopia = $-75 \text{ cm}$

The defects of the eye can be rectified by wearing a concave lens of focal length 75 cm.

21. Reena and Vani find a discarded plastic lens lying on the beach. The girls discuss what they learnt in Physics and argue whether the lens is a converging or diverging one. When they look through the lens, they notice that the objects are inverted.

i) If an object 25 cm in front of the lens forms an image 20 cm behind the lens, what is the focal length of the lens?

Lens formula:

\[
\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{20} - \frac{1}{-25} = \frac{1}{20} + \frac{1}{25} = \frac{5 + 4}{100} = \frac{9}{100}
\]

\[
f = \frac{100}{9} = +11.11 \text{ cm}
\]

ii) It is a converging lens (convex lens) because focal length (f) is positive.

Way2s100@gmail.com - 65 - www.waytosuccess.org
22. Light which is incident on a flat surface makes an angle of 15° with the surface.
   i) What is the angle of incidence?
   ii) What is the angle of reflection?
   iii) Find the angle of deviation.

   Ans:

   ![Diagram of light incidence and reflection]

   i) Angle of incidence = 90° – 15° = 75°
   ii) Angle of reflection = 75°
   (Angle of incidence = Angle of reflection)
   iii) Angle of deviation = 15° + 15° = 30°
   (180° -150° = 30°)

23. How can you identify the three types of mirrors without touching them? Give reasons.

   By seeing our face in the mirror, we can identify the three types of mirror
   i) Plane mirror: Image will be erect and same size as that of the object (ie. our face)
   ii) Concave mirror: Image of the closer object will be magnified and erect.
   iii) Convex mirror: Image will be diminished and erect.

24. What will happen when the frequency of rotation in an AC dynamo is doubled?

   When the frequency in an AC dynamo is doubled therefore the Induced emf will be doubled.

   - Space for Notes -
SECTION - III

FIVE MARK QUESTIONS

Five mark questions will be asked as follows:

<table>
<thead>
<tr>
<th>PART-I</th>
<th>Qn 48 or 49</th>
<th>Immune system (or) Structure and functions of human body organ system</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART-II</td>
<td>Qn 50 or 51</td>
<td>Reproduction in plants (or) Conservation of environment</td>
</tr>
<tr>
<td>PART-III</td>
<td>Qn 52 or 53</td>
<td>Atoms and molecules (or) Carbon and its compounds</td>
</tr>
<tr>
<td>PART-IV</td>
<td>Qn 54 or 55</td>
<td>Laws of motion and gravitation (or) Magnetic effect of electric current and light</td>
</tr>
</tbody>
</table>

QUESTION NO.48 & 49 – BIOLOGY-1
You have to attend one question

QN NO. 48   UNIT-2 IMMUNE SYSTEM

1. Kala has delivered a baby,
   i) Suggest the immunization schedule for the baby, in the first six months.
   ii) What are the diseases that can be cured as per the schedule?
       [Mar-12, 14, 2016, Jun-12, 13, 14, 2016, Sep-13, 2016]
       i)  

       | S.No | Age       | Vaccine | Dosage |
       |------|-----------|---------|--------|
       | 1    | New born baby | BCG     | 1<sup>st</sup> dose |
       | 2    | 15 days    | Oral polio | 1<sup>st</sup> dose |
       | 3    | 6<sup>th</sup> week | DPT & polio | 1<sup>st</sup> dose |
       | 4    | 10<sup>th</sup> week | DPT & polio | 2<sup>nd</sup> dose |
       | 5    | 14<sup>th</sup> week | DPT & polio | 3<sup>rd</sup> dose |

   ii) The diseases that can be cured as per the schedule are:
       1. BCG - Tuberculosis
       2. Oral polio - Polio
       3. DPT - Diphtheria
       4. DPT - Pertussis
       5. DPT - Tetanus

2. There is a widespread outbreak of malaria in your area.
   i) Suggest some controlling measures to the local authorities concerned.
   ii) Pick out the right symptom for malaria.
      (chills, shivering and a rise in temperature / diarrhoea ) [Mar-2013, Mar-15, June-15, Mar-17]
       i) controlling measures are:
           1. Sanitary measures include ground fogging with disinfectants.
           2. Prevent water stagnation and cover ditches and drains.
           3. Use mosquito nets and repellants.
       ii) Symptom for malaria:
           Chill, shivering and a rise in temperature
           (+ Destruction of spleen and liver tissues)

3. 15<sup>th</sup> October is observed as ‘World Hand Washing Day’.
   i) Tell your friend the effects of hand washing.
   ii) How frequently do you wash your hands everyday and when? [Sep-2014]
       Ans:
       i) 1. ‘Hand washing’ is a good habit. It keeps your hand free from dust and harmful microorganisms.
           2. You can avoid the disease causing micro organisms entering into your body.
       ii) 1. Before and after eating food
4. **What is immunity? Write a note on the various types of immunity.**

Immunity is the body’s defence against or the specific resistance exhibited towards infectious organisms.

**Types of Immunity**

- **Natural or Innate Immunity**: The natural or innate immunity that enables an individual to resist the disease, to which the particular species is immune. E.g. Plant diseases do not affect animals.
- **Acquired or Specific Immunity**: The resistance against some infectious diseases developed by an individual during lifetime on exposure to the infections is called acquired or specific immunity. The acquired or specific immunity is of two kinds – active acquired immunity and passive acquired immunity.
  - **A) Active acquired immunity**: This kind of immunity is developed by our body, during the first infection of any pathogen. The antibodies produced in the blood stays for a long period and kills the similar pathogens whenever they enter the body.
    i) If the antibody production is stimulated naturally, after recovery from a disease, it is called *Natural Active Acquired Immunity*.
    ii) If the antibody synthesis is stimulated by application of vaccines or any other man made methods, the immunity gained is called *Artificial Active Acquired Immunity*.
  - **B) Passive Acquired Immunity**: E.g. The polio drops and triple antigen injected into the child in the immunization programme.
In this type of immunity, a readymade antibody is introduced from outside instead of stimulating the body to produce antibody with antigenic stimulus.

i) If the readymade antibody is taken from the mother’s blood into the foetus, it is called *Natural Passive Acquired Immunity*.

ii) If the readymade antibody is given to an individual artificially, (produced in some other animal and extracted) it is called *Artificial Passive Acquired Immunity*. This immunity is not permanent.

5. **Describe the life-cycle of plasmodium in man.**

   1. The sexual stage of Plasmodium takes place in female Anopheles mosquito whereas the asexual stage occurs in man.
   2. When a female Anopheles mosquito bites an infected person, these parasites enter the mosquito and undergo further development in the mosquito body.
   3. The parasites multiply within the body of the mosquito to form sporozoites that are stored in the salivary glands of mosquito.
   4. When these mosquitoes bite a healthy person, the sporozoites (the infectious stage) are introduced into his body; they multiply within the liver cells first and enter the RBC of man, resulting in the rupture of RBC.
   5. This results in the release of toxic substance called haemoglobin which is responsible for the chill and high fever, recurring three to four days.

6. **List out the various diseases caused due to nutritional deficiency. Add a note on their symptoms.**

   1. **Protein deficiency diseases**

      | Deficiency diseases | Symptoms |
      |---------------------|----------|
      | Marasmus            | The child loses weight and suffers severe diarrhoea and it will appear as though bones are covered by skin. |
      | Kwashiorkar         | The child develops an enlarged belly with face and feet swelling. |

   2. **Vitamin deficiency diseases**

      | Vitamins       | Deficiency diseases | Symptoms                                |
      |----------------|--------------------|----------------------------------------|
      | Vitamin A      | Nyctalopia         | Night Blindness                        |
      | Vitamin D      | Rickets            | Defective calcification of bones       |
      | Vitamin E      | Sterility          | Inability to reproduce                 |
      | Vitamin K      | Haemorrhage        | Profuse loss of blood                  |
      | Vitamin B₁     | Beri-Beri          | Nervous disorder                       |
      | Vitamin B₅     | Pellagra           | Dementia, dermatitis, diarrhoea        |
      | Vitamin B₁₂    | Pernicious anaemia | Destruction of RBC                     |
      | Vitamin C      | Scurvy             | Bleeding gums, loosening of teeth      |

QN NO.49  UNIT-3  STRUCTURE AND FUNCTIONS OF HUMAN BODY-ORGAN SYSTEMS

1. **Describe the structure of a neuron with the help of a neat, labelled diagram.** *[Mar-2016, Sep-2016]*

A nerve cell is a microscopic structure consisting of three major parts namely, cell body, dendrites and axon.

**Cell body**
1. The cell structure is irregular in shape or polyhedral.
2. It is also called cyton.
3. Cell body contains cytoplasm with typical cell organelles and certain granular bodies called Nissle’s granules.
4. Nissle’s granules are a group of ribosomes for protein synthesis.

**Dendrites**
1. Dendrites or Dendrons are short fibres which branch repeatedly and protrude out of the cell body.
2. Dendrites transmit electrical impulses towards the cyton.

**Axon**
1. One of the fibres arising from the cell body is very long with a branched distal end and it is called Axon.
2. The distal branch of the axon terminates in bulb-like structures called synaptic knob filled with chemicals called neurotransmitters.
3. The cytoplasm of the axon is known as axoplasm.
4. The axon which is covered by a myelin sheath is formed of many layers of Schwann cells. The outermost layer of Schwann cells is called Neurilemma.
5. The gaps left by the myelin sheath are called Nodes of Ranvier. Neurilemma is discontinuous at Nodes of Ranvier.
6. The myelin sheath ensures rapid transmission of electric impulses.

2. **List out the various parts of the human brain and write a note on their functions.**

<table>
<thead>
<tr>
<th>Major parts of human brain</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fore brain</td>
<td>Cerurom 1. Cerebrum is the seat of consciousness, intelligence, memory, imagination and reasoning. 2. It receives impulses from different parts of the body and initiates voluntary activities. 3. There is a respective centre for hearing, seeing, tasting, smelling and speaking.</td>
</tr>
<tr>
<td>Thalamus</td>
<td>Major conducting centre for sensory and motor signalling.</td>
</tr>
<tr>
<td>Hypothalamus</td>
<td>1. It controls body temperature, urge to eat and drink 2. Regulates sexual behaviour and expresses emotional reactions like excitement, anger, fear, pleasure and motivation.</td>
</tr>
<tr>
<td>Mid brain</td>
<td>Corpora quadrigemina 1. It controls and regulates various visual reflexes and optical orientation.</td>
</tr>
<tr>
<td>Hind brain</td>
<td>Pons 1. It relays the information from the cerebrum to the cerebellum. 2. It contains the sleep and respiratory centres.</td>
</tr>
<tr>
<td>Cerebellum</td>
<td>1. It regulates and coordinates the group movements of voluntary muscles as in walking or running.</td>
</tr>
<tr>
<td>Medulla oblongata</td>
<td>1. It is the centre for several reflexes involved in the regulation of heart beat, blood vessel contraction, breathing, etc.</td>
</tr>
</tbody>
</table>

3. **Name the endocrine glands and their location in the human body. Describe any two of them in detail.**

<table>
<thead>
<tr>
<th>Head</th>
<th>a) pituitary gland  b) pineal gland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck</td>
<td>a) thyroid gland  b) parathyroid gland</td>
</tr>
<tr>
<td>Thorax</td>
<td>Thymus gland</td>
</tr>
<tr>
<td>Abdomen</td>
<td>a) pancreas – Islets of Langerhans  b) adrenal glands – adrenal cortex and adrenal medulla</td>
</tr>
</tbody>
</table>
c) gonads – testes in man and ovaries in woman

1. **Pancreas**
   Pancreas plays a dual role both as an exocrine and an endocrine gland. The endocrine portion is called **Islets of Langerhans**. It consists of two types of cells namely, alpha cells and beta cells. **Alpha cells** produce a hormone called glucagon and **Beta cells** produce insulin.

   **Insulin**
   1. It promotes the uptake of glucose by the cells for tissue oxidation.
   2. It favours conversion of glucose into glycogen and its storage in the liver and the muscles.
   3. It prevents the formation of glucose from protein and fat.
   4. Less production of insulin causes Diabetes mellitus, in which the excess, unused glucose is excreted in the urine.

   **Glucagon**
   1. It is secreted when the glucose level in the blood is low.
   2. It influences conversion of glycogen into glucose, thus raising the blood glucose level.
   3. A proper balance between insulin and glucagon is necessary to maintain proper blood glucose level of 80 – 120 mg / dl of blood.

2. **Adrenal Gland**
   On each kidney is found an adrenal gland. It is composed of two portions an outer adrenal cortex and an inner adrenal medulla.

   **Adrenal cortex:** It secretes two hormones namely, Aldosterone and Cortisone.

   **Aldosterone**
   1. It maintains mineral metabolism by favouring reabsorption of sodium and water and excretion of potassium and phosphate ions.
   2. It maintains electrolyte balance, body fluid volume, osmotic pressure and blood pressure.

   **Cortisone**
   1. It stimulates the breakdown of glycogen into glucose raising the blood glucose level.
   2. It produces an anti-inflammatory reaction and suppresses the immune response.

   **Adrenal medulla:** It secretes two hormones, namely adrenaline and noradrenaline.

   1. Adrenaline and noradrenaline are together called emergency hormones or hormones of fight, flight and fright, as they rapidly mobilize the body to face stress and an emergency situation.
   2. They increase the heart beat.
   3. They increase alertness.
   4. They increase the respiratory rate.
   5. They promote the conversion of glycogen into glucose.
   6. They cause dilation of pupils.
   7. They cause profuse sweating.
   8. They make the hair stand erect.(gooseflesh)
   9. In short, noradrenaline and adrenaline mobilize the body to face an emergency by fighting with it or running away from it.

4. **Why is meiosis called reduction division? Describe the various stages with relevant diagrams. Add a note on significance of meiosis.**

   Meiosis takes place in the specialized diploid cells of gonads and produces four haploid gametes, each having half the number of chromosomes as compared to the parent cell.

   In Meiosis-I, as the chromosomal number is reduced to half, it is called Reduction division.
Meiosis – I: The various events of Meiosis-I are studied under four sub-stages

**Prophase - I**
- The chromatin reticulum unwebs and individual chromosomes get liberated from one another.
- Based on the shape of the chromosomes, this stage is studied under five subdivisions as Leptotene, Zygotene, Pachytene, Diplotene and Diakinesis.

*Leptotene:*
- The chromosomes condense and appear like threads.

*Zygotene:*
- Homologous chromosomes start pairing.
- This pairing is called Synapsis and the paired chromosomes are called Bivalents.

*Pachytene:*
- Crossing over occurs between non-sister chromatids of homologous chromosomes.

*Diplotene:*
- Homologous chromosomes separate and this separation is called terminalization.

*Diakinesis:*
- The nuclear membrane and the nucleolus disappear. The spindle apparatus is formed in the cytoplasm.

**Metaphase - I**
- Bivalents chromosomes appear on the equator of the spindle with their chromatids pointing towards the equatorial plate and the centromere pointing towards the poles.

**Anaphase - I**
- Two groups of chromosomes are produced, one at each pole with half the number of chromosomes.

**Telophase - I**
- The spindle fibres disappear.
- The cytoplasmic division called cytokinesis follows.
Meiosis – II: Meiosis-II is similar to Mitosis and so it is called Meiotic Mitosis.
The events of Meiosis-II are studied in four sub-divisions.

| Prophase - II | • The bivalent chromosomes get shortened.  
|      | • The nucleolus and the nuclear membrane disappear. |
| Metaphase - II | • Chromatids arrange themselves in the equator of the cells. The centromeres are attached to the spindle fibres. |
| Anaphase - II | • The centromere divides into two and the two chromatids separate and now, they are called daughter chromosomes or new chromosomes.  
|      | • The daughter chromosomes move towards the opposite poles. |
| Telophase - II | • The haploid set at the two poles coil to form chromatin material. The nuclear membrane and the nucleolus reappear. Thus two daughter nuclei are formed. |

Cytokinesis
The cytoplasmic division takes place at right angles to the position of the nuclei, resulting in the formation of four gametes.

Significance of Meiosis
1. Haploid sex cells are produced in order to maintain constancy in the number of chromosomes of a species.
2. Crossing over results in variation of genetic traits in the offspring.
3. Variations form the raw material for evolution.

5. Use words from the given list to complete the following paragraph. (The words may be used once/ more than once / not at all). [Jun-2016]
(Skull, Vertebral column, Piamater, Arachnoid membrane, Brain, Spinal cord, Meninges, Duramater)
The central nervous system is covered by three protective coverings collectively called ----------- The outermost cover lying below the ----------- and ----------- is double thick and is called --------- The middle covering is thin and vascularised and is called ------- The innermost cover is a very thin delicate membrane and is closely stretched over the outer surface of --------and ------- and is called ------
Ans: (1) Meninges (2) Skull (3) Vertebral column (4) Duramater (5) Arachnoid membrane (6) Brain (7) Spinal cord (8) Piamater.

6. Match these parts with their functions:-
medulla oblongata, cerebellum, forebrain, thalamus, cerebral cortex, hind brain, pons, hypothalamus
a) Sleep centre and respiratory centre
b) Several reflexes involved in the regulation of heart beat, blood vessel contraction, breathing
c) Consists of cerebrum, thalamus and hypothalamus
d) Motor and sensory areas
e) A major conducting centre for sensory and motor signalling
f) Regulation of sexual behaviour
g) Consists of pons, cerebellum and medulla oblongata
h) Co-ordinates the group movements of voluntary muscles, as in walking or running

<table>
<thead>
<tr>
<th>Parts</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medulla oblongata</td>
<td>b) Several reflexes involved in the regulation of heart beat, blood vessel contraction, breathing</td>
</tr>
<tr>
<td>Cerebellum</td>
<td>h) Co-ordinates the group movements of voluntary muscles, as in walking or running</td>
</tr>
<tr>
<td>Forebrain</td>
<td>c) Consists of cerebrum, thalamus and hypothalamus</td>
</tr>
<tr>
<td>Thalamus</td>
<td>e) A major conducting centre for sensory and motor signalling</td>
</tr>
<tr>
<td>Cerebral cortex</td>
<td>d) Motor and sensory areas</td>
</tr>
<tr>
<td>Hind brain</td>
<td>g) Consists of pons, cerebellum and medulla oblongata</td>
</tr>
<tr>
<td>Pons</td>
<td>a) Sleep centre and respiratory centre</td>
</tr>
<tr>
<td>Hypothalamus</td>
<td>f) Regulation of sexual behaviour</td>
</tr>
</tbody>
</table>
7. Observe the diagram of the human brain and identify the areas mentioned:
   i) The area responsible for consciousness, intelligence, memory, imagination and reasoning.
   ii) The area responsible for regulation and co-ordination of group movements of voluntary muscles.
   iii) The area responsible for sleeping and respiration.
   iv) The area responsible for reflexes involved in the regulation of heart beat, blood vessel contraction, breathing etc.

   **Ans:**  i) Cerebrum  ii) Cerebellum  iii) Pons  iv) Medulla oblongata

---

**QUESTION NO.50 & 51 – BIOLOGY-2**
You have to attend one question

**QN NO.50**  **UNIT-4 REPRODUCTION IN PLANTS**

1. i) Name the process by which a fruit is developed.
   ii) Explain the development process in brief.
   iii) Draw a neat, labelled diagram of that process.  

   **Ans:**
   i) Fertilization
   ii)
   1. The pollen tube enters into the embryo sac through micropyle.
   2. It bursts open, gametes released from the pollen tube and enter into the embryo sac.
   3. One of the gametes fuses with the egg, and the other fuses with the secondary nucleus.
   4. The fusion of a male gamete with egg is known as **fertilization**.
   5. The fertilized egg is known as zygote which develops into embryo.
   6. The fusion of the second male gamete with the secondary nucleus is known as **triple fusion**.
   7. The fertilized secondary nucleus develops into an endosperm.
   8. It is a nutritive tissue meant for the development of the embryo.
   9. The process of fusion of a male gamete with an egg and the other gamete with secondary nucleus is known as **double fertilization**.
   
   iii) Process of fertilization:
2. Write the two events involved in the sexual reproduction of a flowering plant.
i) Discuss the first event and write the types.
ii) Mention the advantages and the disadvantages of that event. [Mar-2013, Mar-2015, June-2015]
The two events involved in sexual reproduction of a flowering plant:
1. Pollination    2. Fertilization

i) The first event is Pollination.

**Pollination:**
The transfer of pollen grains from the anther to the stigma of a flower is called pollination.

**Types of Pollination:**
1. Self pollination    2. Cross pollination

**Self pollination (Autogamy):**
The transfer of pollen grains from the anther of a flower to the stigma of the same flower or another flower of the same plant is known as self pollination.

**Cross pollination (Allogamy):**
The transfer of pollen grains of a flower to the stigma of another flower of a different plant of the same species is called cross pollination.

ii) Advantages & Disadvantages of self pollination

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Self pollination is certain in bisexual flowers.</td>
<td>1. The seeds are less in number.</td>
</tr>
<tr>
<td>2. Flowers do not depend on agents for pollination.</td>
<td>2. The endosperm is minute. Therefore, the seeds produce weak plants.</td>
</tr>
<tr>
<td>3. There is no wastage of pollen grains.</td>
<td>3. New varieties of plants cannot be produced resulting in the degradation of the plant.</td>
</tr>
</tbody>
</table>

Advantages & Disadvantages of cross pollination:

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The seeds produced as a result of cross pollination, develop and germinate properly and grow into better plants.</td>
<td>1. Flowers depend on agents for pollination.</td>
</tr>
<tr>
<td>2. Cross pollination leads to the production of new varieties.</td>
<td>2. There is wastage of pollen grains.</td>
</tr>
<tr>
<td>2. More viable seeds are produced.</td>
<td></td>
</tr>
</tbody>
</table>

3. i) Fruit is the product of fertilization. Is there any fruit which is formed without the act of fertilization?  
ii) Represent the classification of fruits in a diagrammatic sketch. [Mar-2012, Mar-2016]

i) Yes, some fruits develop without the act of fertilization. Such fruits are called Parthenocarpic fruits.
   e.g. seedless grapes, guava, mango etc.

ii) Classification of fruits:
4. **Compare aggregate fruits with multiple fruits and give suitable examples.**  

<table>
<thead>
<tr>
<th>Aggregate fruits</th>
<th>Composite or multiple fruits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Single flower gives many fruits</td>
<td>Many flowers give one fruit.</td>
</tr>
<tr>
<td>2. It is develops from multicarpellary, apocarpous, superior ovary.</td>
<td>It develops from all the flowers of a whole inflorescence</td>
</tr>
<tr>
<td>3. Each free carpel develops into a fruitlet.</td>
<td>Each fertilized flower becomes the fleshy part of the single fruit.</td>
</tr>
<tr>
<td>4. There are no pines on the fruit.</td>
<td>There are pines on the fruit. Eg: Jack fruit</td>
</tr>
<tr>
<td>5. The fruitlets are small</td>
<td>The multiple fruit is generally large in size.</td>
</tr>
<tr>
<td>6. e.g: 1. Polyalthia, 2. Annona squamosa (Custard apple)</td>
<td>e.g. 1. Sorosis – Jackfruit, 2. Syconus – Banyan and fig</td>
</tr>
</tbody>
</table>

5. **Describe the structure of a dicot seed.**  

Dicot Seed (Bean):

1. The seed is bulky, oval and slightly indented on one side.
2. On this side, there is a short longitudinal, whitish ridge called the raphae.
3. At one end of the raphae, there is a minute opening known as germ pore or micropyle.
4. If a water-soaked seed is pressed gently, a small drop of water along with air bubbles will come out through the micropyle.
5. The embryo is enclosed by the seed coat.
6. It consists of cotyledons attached to the primary axis which has a rudimentary root portion called the radicle and a rudimentary stem portion known as plumule.
7. The tip of the radicle projects outside and is nearer to the micropyle.
8. The plumule is placed between the two cotyledons and consists of a shoot axis and a small bud having two tiny folded leaves.
6. **Describe the structure of a monocot seed.**
   1. In paddy, the so-called seed is actually a fruit. It is a simple indehiscent one-seeded fruit known as caryopsis.
   2. The seed coat is very thin. The fruit wall (pericarp) is thin and fused with the seed coat.
   3. The fruit is generally covered with yellowish bract and bracteoles which are commonly known as chaff.
   4. The embryo consists of a single cotyledon called scutellum and a shoot axis. The lower part of the axis is the radicle, covered by a sheath called coleorhiza (root sheath). The upper part is known as plumule which is covered by a sheath called coleoptile.
   5. In a day or two, after the seed is placed in moist soil, the coleorhiza pierces the base of the seed. The radicle comes out next after splitting the coleorhiza.
   6. The radicle does not form the root system. Meanwhile, roots are formed from the lower most nodes of the stem.
   7. These roots are called adventitious roots. These adventitious roots form the fibrous root system of the matured plant.

7. **Observe the given diagram:**
   i) Draw the diagram and label the parts.
   ii) What happens to the parts labelled ‘E’ and ‘F’, after the process of fertilization?

   **Ans:**
   i) The ovary (E) enlarges and develops into fruit
   The ovule (F) develops into seed.

8. **Look at the diagram given below:**
   Answer the following:
   i) Name the method of reproduction depicted here.
   ii) Name an organism in which you find this method of reproduction.
   iii) Does this method of reproduction favour variation?

   **Ans:**
   i) Binary fission    ii) Unicellular organisms, like amoeba and bacteria
   iii) No, this method of reproduction does not favour variation

9. **Imagine you have a garden with the plants listed below. A swarm of bees visit your garden. Do you think the bees will visit all the flowers? Name the flowers which you think the bees will be attracted to. Give reasons to substantiate your answer.**
(Jasmine, Nerium, Gulmohar, Rose, Lotus, Corn, Sugarcane, Bamboo, Chrysanthemum, Dahlia, Grass, Coconut and Peas)

Ans:
The bees will be attracted to Jasmine, Nerium, Gulmohar, Rose, Lotus, Chrysanthemum, Dahlia and peas.

Reasons:
1. Bees are attracted to the bright petals of the flowers.
2. These flowers are large in size and have a sweet smell.
3. Some of these flowers produce nectar.

10. A farmer has two fields A and B. He cultivates peas (Pisum sativum) in both the fields. Field A is covered with nets to keep out birds and insects. Field B is left uncovered.

i) Name the type of pollination that would occur in field ‘A’ and field ‘B’

ii) Which of these fields will give a higher yield?

iii) To raise the next crop, from which field should the seeds be chosen by the farmer. Give reason to support your answer.

Ans:
i) Field ‘A’ : Self pollination  
   Field ‘B’ : Cross pollination

ii) Field ‘B’ will give higher yield.

iii) To raise the next crop, the seeds be chosen from field ‘B’.

Reasons:
1. The seeds produced as a result of cross pollination, develop and germinate properly and grow into better plants.
2. More viable seeds are produced in field ‘B’ due to cross pollination.
3. Cross pollination leads to the production of new varieties.

11. Mango and Coconut are both drupes. The mesocarp of mango is edible, while it is not so in coconut. Based on this fact, answer the following:

i) Which part of the coconut is edible?

ii) Why does the coconut have a fibrous mesocarp?

iii) Can you mention any other use of the fibrous mesocarp?

Ans:
i) The endosperm tissue inside the seed is edible in coconut

ii) The mesocarp of coconut is fibrous and so it is easily carried away by water currents. In this way dispersal of coconut takes place by means of water.

iii) The fibrous mesocarp is used to get coir which is used in making ropes.

iv) The fibrous mesocarp is used as thick protective covering for coconut seed for long time.

12. Group the following under the given heads: (a) fruit (b) seed (c) neither fruit nor seed. tomato, cucumber, sprouted pulses, naked bean, grapes, celery, potato, sugarcane, apple, runner bean.

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Tomato, Cucumber, Grapes, Apple, Runner bean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed</td>
<td>Naked been</td>
</tr>
<tr>
<td>Neither fruit nor seed</td>
<td>Sprouted pulses, Celery, Potato, Sugarcane</td>
</tr>
</tbody>
</table>

13. Ramu and Somu happened to observe Calotropis seeds floating in the air. They decided to follow a few of them till the seeds landed on the ground. They recorded their observations in a table as follows:

<table>
<thead>
<tr>
<th>Distance travelled by seeds in metre</th>
<th>Time taken in minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>6</td>
</tr>
<tr>
<td>50</td>
<td>15</td>
</tr>
<tr>
<td>37</td>
<td>10</td>
</tr>
<tr>
<td>87</td>
<td>17</td>
</tr>
<tr>
<td>17</td>
<td>2</td>
</tr>
</tbody>
</table>

i) Draw a graph for the above data taking Distance on ‘X’ axis and Time on ‘Y’ axis.

ii) Is there any relationship between the distance travelled and the efficiency of dispersal?
iii) State the inference you draw from the graph.

Ans:

i) Graph:

![Graph showing distance travelled by seeds vs time taken](image)

Scale

X-axis = 1 cm = 10 m
Y-axis = 1 cm = 2 min

ii) Yes. The efficiency of seed dispersal depends on distance travelled by seeds. More the distance travelled by seeds, more is the efficiency of dispersal.

iii) The graph shows that the distance travelled by the seeds is directly proportional to time taken by them. If the seeds are able to float in air for longer time then they reach longer distance.

14. Given below is a list of dry fruits. Assign the fruits to their relevant types.
(Cotton, Tridax, Paddy, Castor, Coriander, Beans, Peas, Calotropis, Mirabilis, Cashew, Acacia, Lady’s finger)

Ans:

<table>
<thead>
<tr>
<th></th>
<th>Fruit type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achene</td>
<td>Mirabilis</td>
</tr>
<tr>
<td>Caryopsis</td>
<td>Paddy</td>
</tr>
<tr>
<td>Cypsela</td>
<td>Tridax</td>
</tr>
<tr>
<td>Nut</td>
<td>Cashew</td>
</tr>
<tr>
<td>Cremocarp</td>
<td>Coriander</td>
</tr>
<tr>
<td>Lomentum</td>
<td>Acacia</td>
</tr>
<tr>
<td>Regma</td>
<td>Castor</td>
</tr>
<tr>
<td>Septicidal capsule</td>
<td>Cotton</td>
</tr>
<tr>
<td>Loculicidal capsule</td>
<td>Lady’s finger</td>
</tr>
<tr>
<td>Follicle</td>
<td>Calotropis</td>
</tr>
<tr>
<td>Legume</td>
<td>Beans, Peas</td>
</tr>
</tbody>
</table>

15. Monish enters the kitchen and happens to see his mother getting the ingredients ready to prepare kadamba sambar. He sees the ingredients laid out in the kitchen. Help him sort out the ingredients into the fruit types you have studied.
(dhal, tamarind, brinjal, tomato, drumstick, coriander, mustard, lady’s finger, mango)

Ans:

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Fruit type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dhal</td>
<td>Legume</td>
</tr>
<tr>
<td>Tamarind</td>
<td>Lomentum</td>
</tr>
<tr>
<td>Brinjal</td>
<td>Berry</td>
</tr>
<tr>
<td>Tomato</td>
<td>Berry</td>
</tr>
</tbody>
</table>
16. **Name the parts of a dicot seed based on the given clues:**
   i) Rudimentary root ---------
   ii) Rudimentary shoot ---------
   iii) Fleshy structure storing food for the embryo ---------
   iv) The outer protective layer of a seed is ---------
   v) The minute opening seen in the seed coat is ---------
   **Ans:** i) radicle ii) plumule iii) endosperm iv) seed coat v) micropyle

17. **What are the types of pollination? Which among them is more advantageous? Why?**
   [Jun- 2016]
   1. Pollination is of two types. They are: 1. Self pollination 2. Cross pollination
   2. Cross pollination is more advantageous.
   3. Reasons:
      i) The seeds produced as a result of cross pollination, develop and germinate properly and grow into better plants, i.e. cross pollination leads to the production of new varieties.
      ii) More viable seeds are produced.

18. **What is self-pollination? Mention its merits and demerits.**
   **Self Pollination**
   The transfer of pollen grains from the anther of a flower to the stigma of the same flower or another flower of the same plant is known as self pollination.
   **Advantages of self pollination (Merits)**
   1. Self pollination is certain in bisexual flowers.
   2. Flowers do not depend on agents for pollination.
   3. There is no wastage of pollen grains.
   **Disadvantages of self pollination (demerits)**
   1. The seeds are less in number.
   2. The endosperm is minute. Therefore, the seeds produce weak plants.
   3. New varieties of plants cannot be produced, resulting in the degradation of the plant.

19. **What is known as pollination? List out biotic and abiotic factors which are involved in pollination?**
   **Pollination:** The transfer of pollen grains from the anther to stigma of a flower is called pollination.
   **Biotic factors involved in pollination:**
   1. Animals (Zoophily)
   2. Birds (Ornithophily)
   3. Insects (Entamophily)
   **Abiotic factors involved in pollination:**
   1. Wind (Anemophily)
   2. Water (Hydrophily)

**Qn NO. 51 UNIT-7 CONSERVATION OF ENVIRONMENT**
1. i) Classify the following substances – wood, paper, plastic and grass.
   ii) Give a detailed account of your classification.
   **[Sep-2013, Sep-2015]**
   i) Classification of the substance:
<table>
<thead>
<tr>
<th>Bio-degradable wastes</th>
<th>Non-biodegradable wastes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood, paper, grass.</td>
<td>Plastic</td>
</tr>
</tbody>
</table>
ii) 1. Substances that are broken down by biological process or microbial action are called bio-degradable waste. e.g. wood, paper, grass and leaves.

2. Substances that are not broken down by biological or microbial action are called non-bio-degradable wastes. e.g. Plastic substances and mineral wastes.

2. In your locality people are affected due to water scarcity. What measures will you take to deal with the problem of water scarcity?  

[March 2013, June 2014, March 2015]

i) Seeding clouds
Seeding clouds with dry ice or potassium iodide particles sometimes can initiate rain, if water laden clouds and conditions that favour precipitation are present.

ii) Desalination: (Reverse osmosis)
Desalination of ocean water is a technology that has a great potential for increasing the supply of fresh water. In desalination, the common methods of evaporation and re-condensation are involved.

iii) Dams, reservoirs and canals
Dams and storage reservoirs trap run-off water in them and transfer the water from areas of excess to areas of deficit using canals and underground pipes.

iv) Watershed management
The management of rain water and resultant run-off is called water shed management. Water shed is an area characterized by construction of small dams to hold back water which will provide useful wildlife habitat and stock watering facilities.

v) Rainwater harvesting
Rainwater harvesting essentially means collecting rain water from the roof of buildings or courtyards and storing it underground for later use. The main idea in harvesting rain water is to check the run-off water. The rain water that falls on the roofs of buildings or in courtyards is collected through pipes and stored in underground tanks of the buildings fitted with motor for drawing the water for use. The process of rainwater harvesting is not only simple but also economically beneficial. It helps in meeting the increased demand for water, particularly in urban areas and prevent flooding of living areas.

vi) Wetland conservation
It preserves natural water storage and acts as aquifer recharge zones.

vii) Domestic conservation
As an individual, everyone can reduce the water loss by using a bucket of water than by taking a shower, using low-flow taps, using recycled water for lawns, home gardens, vehicle washing and using water conserving appliances.

viii) Industrial conservation
Cooling water can be recharged and waste water can be treated and reused.

3. We are surrounded by smoke. Is this situation good for our health? Give reason.
No. this situation is not good for our health.

Reasons:
1. Smoke is made up of a complex mixture of gases and fine particles. These fine particles can get into our eyes and respiratory system, where they can cause health problems such as burning eyes, runny nose, and bronchitis.

2. Fine particles also can aggravate chronic heart and lung diseases.

3. Smoke from vehicles containing SO$_2$ and NO$_2$ causes acid rain which spoils crops

4. Smoke and greenhouse gases are being released by industries into the air which causes increase in global warming.

5. Hydrocarbons are formed by incomplete combustion of fuel used in automobiles. Hydrocarbons cause cancer.

4. List out the harmful effects of burning coal.  

[March 12, 14, 2016, June 13, 2016, September 14, 2016]

1. Generation of waste products which contain mercury, uranium, thorium, arsenic and other heavy metals, which are harmful to human health and environment.

2. Sulphur particles present in the coal causes acid rain.
3. Interference with ground water and water table levels.
4. Contamination of land and water bodies.
5. Dust pollution.
6. Release of CO₂, a green house gas, causing climate change and global warming.
7. Coal is the largest contributor to the man-made increase of CO₂ in the air.

**QUESTION NO.52 & 53 – CHEMISTRY**

You have to attend one question

### QN NO.52  UNIT-10 ATOMS AND MOLECULES

1. Modern atomic theory takes up the wave concept, principle of uncertainty and other latest discoveries to give a clear cut picture about an atom. State the findings of modern atomic theory.  
   
   **[June-2014, Mar-17]**
   
   1. Atom is considered to be a divisible particle.
   2. Atoms of the same element may not be similar in all respects.
   
   e.g. Isotopes \( ^{35}\text{Cl}, \, ^{37}\text{Cl} \)
   
   3. Atoms of different elements may be similar in some respects
   
   e.g. Isobars \( ^{40}\text{Ar}, \, ^{40}\text{Ca} \)
   
   4. Atom is the smallest particle which takes part in chemical reactions.
   5. The ratio of atoms in a molecule may be fixed and integral but may not be simple
   
   e.g. \( \text{C}_{12}\text{H}_{22}\text{O}_{11} \) is not a simple ratio (Sucrose)
   
   6. Atoms of one element can be changed into atoms of another element by transmutation.
   7. The mass of an atom can be converted into energy.

   This is in accordance with Einstein’s equation \( E = mc^2 \)

2. How will you establish the relation between vapour density and molecular mass of a gas by applying Avogadro’s law?  
   
   **[Sep-2013, Sep-2014]**
   
   **Relative Molecular Mass:**

   It is defined as the ratio of the mass of 1 molecule of the gas or vapour to the mass of 1 atom of hydrogen.

   \[
   \text{Relative molecular mass} = \frac{\text{Mass of 1 molecule of the gas or vapour}}{\text{Mass of 1 atom of hydrogen}}
   \]

   **Vapour Density (V.D):**

   It is defined as the ratio of the mass of a certain volume of the gas or vapour to the mass of the same volume of hydrogen at the same temperature and pressure.

   \[
   \text{V.D} = \frac{\text{Mass of 1 volume of gas or vapour}}{\text{Mass of 1 volume of hydrogen}}
   \]

   Applying Avogadro’s Law,

   \[
   \text{V.D} = \frac{\text{Mass of 1 molecule of gas or vapour}}{\text{Mass of 1 molecule of hydrogen}}
   \]

   Since hydrogen is diatomic,

   \[
   \text{V.D} = \frac{\text{Mass of 1 molecule of gas or vapour}}{2 \times \text{Mass of 1 atom of hydrogen}}
   \]

   Multiplying both sides by 2, we get

   \[
   2 \times \text{V.D} = \frac{\text{Mass of 1 molecule of gas or vapour}}{\text{Mass of 1 atom of hydrogen}}
   \]

   \[
   2 \times \text{V.D} = \text{relative molecular mass of a gas or vapour}
   \]
2 × Vapour density = Relative molecular mass

3. Calculate the number of moles in:
   i) $12.046 \times 10^{23}$ atoms of Copper
      
      Number of moles = \( \frac{\text{Number of atoms}}{\text{Avogadro number}} \) = \( \frac{12.046 \times 10^{23}}{6.023 \times 10^{23}} \) = 2 moles

   ii) 27.95g of Iron

      Number of moles = \( \frac{\text{Mass}}{\text{Atomic mass}} \) = \( \frac{27.95}{55.9} \) = 0.5 moles

   iii) $1.51 \times 10^{23}$ molecules of CO$_2$

      Number of moles = \( \frac{\text{Number of molecules}}{\text{Avogadro number}} \) = \( \frac{1.51 \times 10^{23}}{6.023 \times 10^{23}} \) = 0.25 moles

4. Find the gram molecular mass of the following from the data given:
   i) H$_2$O   ii) CO$_2$   iii) NaOH   iv) NO$_2$   v) H$_2$SO$_4$

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>SYMBOL</th>
<th>ATOMIC NO.</th>
<th>ATOMIC MASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen</td>
<td>H</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Carbon</td>
<td>C</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Oxygen</td>
<td>O</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>N</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Sodium</td>
<td>Na</td>
<td>11</td>
<td>23</td>
</tr>
<tr>
<td>Sulphur</td>
<td>S</td>
<td>16</td>
<td>32</td>
</tr>
</tbody>
</table>

   Ans:
   i) H$_2$O
      
      Gram molecular mass of H$_2$O = 2 (H) + 1 (O) = 2 (1) + 1 (16) = 2 + 16 = 18 g

   ii) CO$_2$

      Gram molecular mass of CO$_2$ = 1 (C) + 2 (O) = 1 (12) + 2 (16) = 12 + 32 = 44 g

   iii) NaOH

      Gram molecular mass of NaOH = 1 (Na) + 1 (O) + 1 (H) = 1 (23) + 1 (16) + 1 (1) = 23 + 16 + 1 = 40 g

   iv) NO$_2$

      Gram molecular mass of NO$_2$ = 1 (N) + 2 (O) = 1 (14) + 2 (16) = 14 + 32 = 46 g

   v) H$_2$SO$_4$

      Gram molecular mass of H$_2$SO$_4$ = 2 (H) + 1 (S) + 4 (O) = 2 (1) + 1 (32) + 4 (16) = 2 + 32 + 64
5. Complete the table given below: 

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>ATOMIC MASS</th>
<th>MOLECULAR MASS</th>
<th>ATOMICITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine</td>
<td>35.5</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>Ozone</td>
<td>48</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Sulphur</td>
<td>32</td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

Ans:

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>ATOMIC MASS</th>
<th>MOLECULAR MASS</th>
<th>ATOMICITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine</td>
<td>35.5</td>
<td>71</td>
<td>2</td>
</tr>
<tr>
<td>Ozone</td>
<td>16</td>
<td>48</td>
<td>3</td>
</tr>
<tr>
<td>Sulphur</td>
<td>32</td>
<td>256</td>
<td>8</td>
</tr>
</tbody>
</table>

Hint: Atomicity = \( \frac{\text{Molecular mass}}{\text{Atomic mass}} \)

Atomicity of chlorine = \( \frac{71}{35.5} = 2 \)

Atomic mass of ozone = \( \frac{48}{3} = 16 \text{ g} \)

Molecular mass of sulphur = Atomicity × Atomic mass

= \( 8 \times 32 = 256 \text{ g} \)

6. Calculate the number of water molecules present in one drop of water which weighs 0.18g

Gram molecular mass of water (H\(_2\)O) = \( 2 (\text{H}) + 1 (\text{O}) \)

= \( 2 (1) + 1 (16) \)

= 18 g

Number of molecules present in 18 g of water = \( 6.023 \times 10^{23} \)

\( \therefore \) Number of molecules present in 0.18 g of water = \( \frac{6.023 \times 10^{23}}{18} \times 0.18 \)

= \( 6.023 \times 10^{21} \) molecules

7. Fill in the blanks using the given data:
The formula of Calcium oxide is CaO. The atomic mass of Ca is 40, Oxygen is 16 and Carbon is 12.

i) 1 mole of Ca (--- g) and 1 mole of Oxygen atom (--- g) combine to form ---- mole of CaO (--- g).

ii) 1 mole of Ca (----- g) and 1 mole of C (----- g) and 3 moles of Oxygen atom (----- g) combine to form 1 mole of CaCO\(_3\) (----- g)

Ans:

i) 1 mole of Ca (40 g) and 1 mole of Oxygen atom (16 g) combine to form 1 mole of CaO (56 g).

ii) 1 mole of Ca (40 g) and 1 mole of C (12 g) and 3 moles of Oxygen atom (48 g) combine to form 1 mole of CaCO\(_3\) (100 g)

8. How many grams are there in:

i) 5 moles of water ii) 2 moles of Ammonia iii) 2 moles of Glucose

Number of moles = \( \frac{\text{Mass}}{\text{Molecular mass}} \)

\( \therefore \) Mass = Number of moles × Molecular mass

i) Molecular mass of water (H\(_2\)O) = \( 2 (\text{H}) + 1 (\text{O}) \)
i) Molecular mass of ammonia (NH₃) = 1 (N) + 3 (H) = 1 (14) + 3 (1) = 14 + 3 = 17 g

Mass of ammonia = Number of moles × Molecular mass
= 2 × 17
= 34 g

iii) Molecular mass of glucose (C₆H₁₂O₆) = 6 (C) + 12 (H) + 6 (O) = 6 (12) + 12 (1) + 6 (16) = 72 + 12 + 96 = 180 g

Mass of glucose = Number of moles × Molecular mass
= 2 × 180
= 360 g

PART – C (Big Questions)

1. When ammonia reacts with hydrogen chloride gas, it produces white fumes of ammonium chloride. The volume occupied by NH₃ in glass bulb A is three times more than the volume occupied by HCl in glass bulb B at STP.

   (Atomic mass of N = 14, H = 1, Cl = 35.5)

   i) How many moles of ammonia are present in glass bulb A?
   ii) How many grams of NH₄Cl will be formed when the stopper is opened?
   iii) Which gas will remain after completion of the reaction?
   iv) Write the chemical reaction involved in this process.

Ans:

i) Number of moles of ammonia resent in glass bulb A:

At STP 22.4 litre of any gas contains = 1 mole

∴ At STP 67.2 litre of NH₃ contains = \( \frac{1}{22.4} \times 67.2 = 3 \) moles

ii) Mass of NH₄Cl formed when the stopper is opened:

1 mole of NH₃ reacts with one mole of HCl to give one mole of NH₄Cl
Molecular mass of $\text{NH}_4\text{Cl}$  

\begin{align*}
\text{Molecular mass of } \text{NH}_4\text{Cl} & = 1 \text{ (N)} + 4 \text{ (H)} + 1 \text{ (Cl)} \\
& = 1 \text{ (14)} + 4 \text{ (1)} + 1 \text{ (35.5)} \\
& = 14 + 4 + 35.5 \\
& = 53.5 \text{ g}
\end{align*}

Mass of $\text{NH}_4\text{Cl} = \text{number of moles} \times \text{Molecular mass} \\
\quad = 1 \times 53.5 \\
\quad = 53.5 \text{ g}

iii) The gas that will remain after completion of the reaction: 
2 moles of $\text{NH}_3$

iv) Chemical Reaction: 
\[3\text{NH}_3 + \text{HCl} \rightarrow \text{NH}_4\text{Cl} + 2 \text{NH}_3\]

2. Nitro glycerine is used as an explosive. The equation for the explosive reaction is 
\[4 \text{C}_3\text{H}_5(\text{NO}_3)_3(l) \rightarrow 12 \text{CO}_2(g) + 10 \text{H}_2\text{O}(l) + 6\text{N}_2(g) + \text{O}_2(g)\] 
(Atomic mass of C = 12, H = 1, N = 14, O=16)

i) How many moles does the equation show for i) Nitroglycerine ii) gas molecules produced? 
ii) How many moles of gas molecules are obtained from 1 mole of nitroglycerine? 
iii) What is the mass of 1 mole of nitroglycerine?

Ans: 

i) Number of moles of Nitroglycerine  \(= 4 \text{ moles}\)  
Number of moles gas molecules produced = 12 + 6 + 1 = 19 moles 

ii) \(4 \text{ moles of nitroglycerine gives} = 19 \text{ moles of gas molecules}\) 
\[\therefore \text{1 mole of nitroglycerine gives} = \frac{19}{4} \times 1 = 4.75 \text{ moles of gas molecules}\]

iii) Mass of 1 mole of nitroglycerine: 

\begin{align*}
\text{Molecular mass of nitroglycerine } \text{C}_3\text{H}_5(\text{NO}_3)_3 & = 3 \text{ (C)} + 5 \text{ (H)} + 3 \text{ (N)} + 9 \text{ (O)} \\
& = 3 \text{ (12)} + 5 \text{ (1)} + 3 \text{ (14)} + 9 \text{ (16)} \\
& = 227 \text{ g}
\end{align*}

\[\text{Mass} = \text{number of moles} \times \text{molecular mass}\]  
\[= 1 \times 227\]  
\[= 227 \text{ g}\]

3. Sodium bi carbonate breaks down on heating: 
\[2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2\]  
(Atomic mass of Na = 23, C = 12, H = 1, O =16)

i) How many moles of sodium bi carbonate are there in the equation? 
ii) What is the mass of sodium bi carbonate used in this equation? 
iii) How many moles of carbon dioxide are there in this equation?

Ans: 

i) 2 moles of sodium bicarbonate. 

ii) Molecular mass of sodium bicarbonate $\text{NaHCO}_3 = 1 \text{ (Na)} + 1 \text{ (H)} + 1 \text{ (C)} + 3 \text{ (O)}$ 
\[= 1 \text{ (23)} + 1 \text{ (1)} + 1 \text{ (12)} + 3 \text{ (16)}\]  
\[= 23 + 1 + 12 + 48\]  
\[= 84 \text{ g}\]

\[\text{Mass of sodium bicarbonate} = \text{number of moles} \times \text{molecular mass}\]  
\[= 2 \times 84\]  
\[= 168 \text{ g}\]
4. **40g of calcium was extracted from 56g of calcium oxide**  
(Atomic mass of Ca = 40, O =16)  
i) What mass of oxygen is there in 56 g of calcium oxide?  
ii) How many moles of oxygen atoms are there in this?  
iii) How many moles of calcium atoms are there in 40 g of calcium?  
iv) What mass of calcium will be obtained from 1000 g of calcium oxide?  
**Ans:**  
i) Molecular mass of calcium oxide CaO = 1 (Ca) + 1 (O)  
= 1 (40) + 1 (16) = 56 g  
56 g of calcium oxide contains  
= 56 – 40 = 16 g of oxygen  
ii) Number of moles of oxygen atoms  
= \( \frac{\text{Mass}}{\text{Atomic mass}} \)  
= \( \frac{16}{16} \) = 1 mole  
iii) Number of moles of calcium atoms  
= \( \frac{\text{Mass}}{\text{Atomic mass}} \)  
= \( \frac{40}{40} \) = 1 mole  
iv) Mass of calcium obtained from 56 g of calcium oxide = 40 g  
\[ \therefore \text{Mass of calcium obtained from 1000 g of calcium oxide} = \frac{40}{56} \times 1000 \]  
\[ = 714.29 \text{ g} \]

5. **How many grams are there in the following?**  
i) 1 mole of chlorine molecule, Cl\(_2\)  
i) 2 moles of sulphur molecules, S\(_8\)  
iii) 4 moles of ozone molecules, O\(_3\)  
iv) 2 moles of nitrogen molecules, N\(_2\)  
**Ans:**  
i) Molecular mass of Cl\(_2\) = 2 (Cl) = 2 (35.5) = 71 g  
\[ \text{Mass} = \text{number of moles} \times \text{molecular mass} \]  
\[ = 1 \times 71 = 71 \text{ g} \]  
i) Molecular mass of S\(_8\) = 8 (S) = 8 (32) = 256 g  
\[ \text{Mass} = \text{number of moles} \times \text{molecular mass} \]  
\[ = 2 \times 256 = 512 \text{ g} \]  
i) Molecular mass of O\(_3\) = 3 (O) = 3 (16) = 48 g  
\[ \text{Mass} = \text{number of moles} \times \text{molecular mass} \]  
\[ = 4 \times 48 = 192 \text{ g} \]  
i) Molecular mass of N\(_2\) = 2 (N) = 2 (14) = 28 g  
\[ \text{Mass} = \text{number of moles} \times \text{molecular mass} \]  
\[ = 2 \times 28 = 56 \text{ g} \]

6. **Find how many moles of atoms are there in:**  
i) 2 g of nitrogen.  
iib) 23 g of sodium  
iic) 40 g of calcium.  
iv) 1.4 g of lithium  
v) 32 g of sulphur.  
\[ \text{i) Number of moles of nitrogen atoms} = \frac{\text{Mass}}{\text{Atomic mass}} = \frac{2}{14} = 0.142 \text{ mole} \]  
\[ \text{ii) Number of moles of sodium atoms} = \frac{\text{Mass}}{\text{Atomic mass}} = \frac{23}{23} = 1 \text{ mole} \]
10\textsuperscript{th} Science  

**Five Mark Questions**

**Way to Success**

iii) Number of moles of calcium atoms \[ \frac{\text{Mass}}{\text{Atomic mass}} = \frac{40}{40} = 1 \text{ mole} \]

iv) Number of moles of lithium atoms \[ \frac{\text{Mass}}{\text{Atomic mass}} = \frac{1.4}{7} = 0.2 \text{ mole} \]

v) Number of moles of sulphur atoms \[ \frac{\text{Mass}}{\text{Atomic mass}} = \frac{32}{32} = 1 \text{ mole} \]

**QN NO.53 UNIT-13 CARBON AND ITS COMPOUNDS**

1. Fill in the blanks in the given table using suitable formulae

<table>
<thead>
<tr>
<th>No</th>
<th>Alkane</th>
<th>Alkene</th>
<th>Alkyne</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C\textsubscript{2}H\textsubscript{6} Ethnae</td>
<td>-------- Ethene</td>
<td>C\textsubscript{2}H\textsubscript{2} Ethyne</td>
</tr>
<tr>
<td>2</td>
<td>-------- Propane</td>
<td>C\textsubscript{3}H\textsubscript{8} Propene</td>
<td>-------- Propyne</td>
</tr>
<tr>
<td>3</td>
<td>C\textsubscript{4}H\textsubscript{10} Butane</td>
<td>-------- Butene</td>
<td>-------- Butyne</td>
</tr>
</tbody>
</table>

Ans:

<table>
<thead>
<tr>
<th>No</th>
<th>Alkane</th>
<th>Alkene</th>
<th>Alkyne</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C\textsubscript{2}H\textsubscript{6} Ethnae</td>
<td>C\textsubscript{2}H\textsubscript{4} Ethene</td>
<td>C\textsubscript{2}H\textsubscript{2} Ethyne</td>
</tr>
<tr>
<td>2</td>
<td>C\textsubscript{3}H\textsubscript{8} Propane</td>
<td>C\textsubscript{3}H\textsubscript{6} Propene</td>
<td>C\textsubscript{3}H\textsubscript{4} Propyne</td>
</tr>
<tr>
<td>3</td>
<td>C\textsubscript{4}H\textsubscript{10} Butane</td>
<td>C\textsubscript{4}H\textsubscript{8} Butene</td>
<td>C\textsubscript{4}H\textsubscript{6} Butyne</td>
</tr>
</tbody>
</table>

2. Homologous series predict the properties of the members of the series.
   **Justify this statement through its characteristics.**
   A homologous series is a group or a class of organic compounds having similar structure and similar chemical properties in which the successive compounds differ by a CH\textsubscript{2} group.
   **Characteristics of homologous series:**
   1. Each member of the series differs from the preceding or succeeding member by a common difference of CH\textsubscript{2} and by a molecular mass of 14 amu (amu = atomic mass unit).
   2. All members of homologous series contain same elements and the same functional groups.
   3. All members of homologous series have same general molecular formula.
      e.g. Alkane = C\textsubscript{n}H\textsubscript{2n+2}  Alkene = C\textsubscript{n}H\textsubscript{2n}  Alkyne = C\textsubscript{n}H\textsubscript{2n−2}
   4. The members in each homologous series show a regular gradation in their physical properties with respect to increase in molecular mass.
   5. The chemical properties of the members of the homologous series are similar.
   6. All members of homologous series can be prepared by using same general method.

3. Write the common name and IUPAC name of the following.

<table>
<thead>
<tr>
<th>Compound</th>
<th>Common name</th>
<th>IUPAC Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH\textsubscript{3}CH\textsubscript{2}CHO</td>
<td>Propionaldehyde</td>
<td>Propanal</td>
</tr>
<tr>
<td>CH\textsubscript{3}CO-CH\textsubscript{3}</td>
<td>Dimethyl ketone or Acetone</td>
<td>Propanone</td>
</tr>
<tr>
<td>CH\textsubscript{3}CH-CH\textsubscript{3}OH</td>
<td>Isopropyl alcohol</td>
<td>2-propanol</td>
</tr>
<tr>
<td>CH\textsubscript{3}COOH</td>
<td>Acetic acid</td>
<td>Ethanoic acid</td>
</tr>
<tr>
<td>HCHO</td>
<td>Formaldehyde</td>
<td>Methanal</td>
</tr>
</tbody>
</table>

4. Look at the diagram and answer the following questions:
   i) What type of structure do diamond and graphite have?

way2s100@gmail.com - 88 - www.waytosuccess.org
ii) Why are diamonds used in cutting tools?  
iii) Why is graphite used in electrical circuits?  
iv) Name the force that accounts for the softness of graphite.  
v) Name the precious diamond you know and give its weight in grams.  

**Ans:**  
i) Diamond: Tetrahedral rigid three dimensional structure  
Graphite: Hexagonal layers (held together by weak Vander Waals forces)  

ii) In diamond each carbon atom is bonded to four other carbon atoms forming a tetrahedral rigid three dimensional structure, accounting for its hardness and rigidity. So, diamonds are used in cutting tools.  

iii) Graphite is a good conductor of electricity since it has **free electrons** in it.  

iv) Vander Waals force  
v) Kohinoor Diamond. Weight = 21.68 g  

5. **C\(_n\)H\(_{2n+2}\) is the general formula of a homologous series of hydrocarbons.**  
i) Is this series saturated or unsaturated?  

ii) Name the series described above. Give the formula and name of the member with two carbon atoms.  

iii) Draw the structural formula of the first member of this series.  

iv) Define the homologous series and find the common difference between the successive members of this family.  

v) Write the formula of n-butane and n-pentane.  

**Ans:**  
i) Saturated  

ii) Alkanes.  
CH\(_3\)-CH\(_3\) - Ethane  

iii) CH\(_4\) Methane  

iv) A homologous series is a group or a class of organic compounds having similar structure and similar chemical properties in which the successive compounds differ by a CH\(_2\) group.  
The common difference between the successive members of this family is CH\(_2\).  

v) n-butane CH\(_3\)-CH\(_2\)-CH\(_2\)-CH\(_3\)  
n-pentane CH\(_3\)-CH\(_2\)-CH\(_2\)-CH\(_2\)-CH\(_3\)  

6. **Ethanol is heated with excess concentrated H\(_2\)SO\(_4\) at 443K.**  
i) Name the reaction that occurs and explain it.  

ii) Write the equation for the above reaction.  

iii) What is the product formed? What happens when this gas is passed through bromine water?  

iv) When ethanol vapour is passed through bromine water, why does no change occur?  

**Ans:**  
i) Intra molecular dehydration  
Ethanol, when heated with excess conc. H\(_2\)SO\(_4\) at 443K undergoes intra molecular dehydration (i.e. removal of water within a molecule of ethanol).  

ii) Equation
i) Ethene.
   When ethene gas is passed through bromine water, **decolouration** occurs.

iv) When ethanol vapour is passed through bromine water, no change occurs because ethanol is a saturated compound.

7. **Complete the following table:**

<table>
<thead>
<tr>
<th>Molecular formula</th>
<th>Common name</th>
<th>IUPAC name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH₃CH₂-CH₂CH₂OH</td>
<td>Dimethyl ketone</td>
<td></td>
</tr>
<tr>
<td>HCOOH</td>
<td>Propanal</td>
<td>Butanone</td>
</tr>
</tbody>
</table>

**Ans:**

<table>
<thead>
<tr>
<th>Molecular formula</th>
<th>Common name</th>
<th>IUPAC name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH₃CH₂-CH₂CH₂OH</td>
<td>n-Butyl alcohol</td>
<td>1-Butanol</td>
</tr>
<tr>
<td>CH₃CO-CH₃</td>
<td>Dimethyl ketone</td>
<td>Propanal</td>
</tr>
<tr>
<td>CH₃CH₂CHO</td>
<td>Propionaldehyde</td>
<td>Propanal</td>
</tr>
<tr>
<td>HCOOH</td>
<td>Formic acid</td>
<td>Methanoic acid</td>
</tr>
<tr>
<td>CH₃CO-CH₂CH₃</td>
<td>Ethyl methyl ketone</td>
<td>Butanone</td>
</tr>
</tbody>
</table>

8. **Ethanoic acid is a member of Homologous series with general formula CₙH₂ₙ₊₁ COOH.**
   i) Name the series and give its functional group.
   ii) Give the molecular formula and the common name of ethanoic acid.
   iii) If this compound is mixed with ethanol in the presence of Conc.H₂SO₄, a sweet smelling compound is formed. Give the equation and name the compound.
   iv) Ethanoic acid reacts with carbonates. Which gas is liberated during this reaction?
   v) Write the balanced equation for the reaction of ethanoic acid with carbonate.
   vi) Your grandmother has prepared mango pickle. What has she added to preserve it for a long time?

**Ans:**

i) Name: Carboxylic acids  
   Functional group - COOH

ii) Molecular formula CH₃-COOH  
   Common Name: Acetic acid

iii) Sweet smelling compound is ethyl ethanoate

$$
\text{CH}_3\text{COOH} + \text{H}_2\text{O-C}_2\text{H}_5 \xrightarrow{\text{Conc. H}_2\text{SO}_4} \text{CH}_3\text{COO-C}_2\text{H}_5 + \text{H}_2\text{O}
$$

   Ethanoic acid  
   Ethanol  
   Ethyl ethanoate

iv) Carbon dioxide CO₂

v) 2CH₃COOH + Na₂CO₃ → 2CH₃COONa + CO₂↑ + H₂O  
   Sodium ethanoate

vi) Vinegar

9. i) **Identify A & B**
ii) Convert ethanol into power alcohol. Mention one of its uses.

iii) What should be added to obtain denatured spirit?

iv) Give one use of denatured spirit.

Ans:

i) $A = \text{Methylated spirit}$  $B = \text{Rectified spirit}$

ii) Mixture of petrol and ethanol is called power alcohol. It is used as motor fuel.

iii) Pyridine

iv) Denatured spirit is used as a fuel in spirit lamp.

10. Write a balanced equation using the correct symbols for these chemical reactions:

i) Action of hydrogen on ethene in the presence of nickel catalyst.

ii) Combustion of methane evolving carbon dioxide and water.

iii) Dehydrogenation of ethanol.

iv) Decarboxylation of Sodium salt of ethanoic acid.

Ans:

i) $\text{CH}_2 = \text{CH}_2 + \text{H}_2 \xrightarrow{\text{Ni-Catalyst}} \text{CH}_3\text{CH}_3$

ii) $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O} + \text{heat} + \text{light}$

iii) $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{Cu} / 573 K} \text{CH}_3\text{CHO} + \text{H}_2$

iv) $\text{CH}_3\text{COONa} \xrightarrow{\text{NaOH/CaO}} \text{CH}_4 \uparrow + \text{Na}_2\text{CO}_3$

11. Look at the picture and identify what happens. Support your answer with equations.

i) How is B formed from A?

ii) What happens when acetic acid is treated with carbonate salt. Name the gas produced. What happens when this gas is treated with lime water?

iii) What happens when acetic acid is treated with ethanol in the presence of concentrated $\text{H}_2\text{SO}_4$? Give the equation.
Ans:

i) Ethanol on oxidation in the presence of alkaline potassium permanganate or acidified potassium dichromate gives ethanoic acid.

\[
\text{CH}_3\text{-CH}_2\text{OH} \xrightarrow{\text{2}[\text{O}] \text{Kmno}_4/\text{OH}^-} \text{CH}_3\text{-COOH} + \text{H}_2\text{O}
\]

Ethanoic acid

ii) Name of the gas - Carbon dioxide (CO\(_2\))

Carbon dioxide turns lime water milky.

\[
2\text{CH}_3\text{COOH} + \text{Na}_2\text{CO}_3 \rightarrow 2\text{CH}_3\text{COONa} + \text{CO}_2 \uparrow + \text{H}_2\text{O}
\]

Sodium acetate

iii) Ethanol reacts with acetic acid in the presence of conc. H\(_2\)SO\(_4\) (catalyst) to form ethyl ethanoate and water. The reaction is called esterification.

\[
\text{CH}_3\text{-COOH} + \text{H}_2\text{O-C}_2\text{H}_5 \xrightarrow{\text{Conc. H}_2\text{SO}_4} \text{CH}_3\text{-COO-C}_2\text{H}_5 + \text{H}_2\text{O}
\]

Ethanoic acid Ethanol Ethyl ethanoate

12. Organic compounds ‘A’ and ‘B’ are the isomers with the molecular formula C\(_2\)H\(_6\)O. Compound ‘A’ produces hydrogen gas with sodium metal, whereas compound ‘B’ does not. Compound ‘A’ reacts with acetic acid in the presence of concentrated H\(_2\)SO\(_4\) (catalyst) to form compound ‘C’ with a fruity flavour. What are the isomers ‘A’, ‘B’ and the compound ‘C’.

i) Compound ‘A’ produces hydrogen gas with sodium metal. So, it is an alcohol. Molecular formula of ‘A’ is C\(_2\)H\(_6\)O. So, it is ethyl alcohol.

\[
\text{CH}_3\text{-CH}_2\text{-OH} + 2\text{Na} \rightarrow 2\text{C}_2\text{H}_5\text{ONa} + \text{H}_2\uparrow
\]

ii) Compound ‘B’ is an isomer of ethanol. So, it is dimethyl ether.

This dimethyl ether will not react with sodium metal

iii) Compound ‘A’ reacts with acetic acid in the presence of concentrated H\(_2\)SO\(_4\) to form compound ‘C’ with a fruity flavour. Compound ‘C’ is ethyl ethanoate (ester).

\[
\text{CH}_3\text{-COOH} + \text{H}_2\text{O-C}_2\text{H}_5 \xrightarrow{\text{Conc. H}_2\text{SO}_4} \text{CH}_3\text{-COO-C}_2\text{H}_5 + \text{H}_2\text{O}
\]

Ethanoic acid Ethanol Ethyl ethanoate

iv) So the organic compounds A, B, C are as follows.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CH(_3)\text{-CH}_2\text{-OH}</td>
<td>Ethyl alcohol</td>
</tr>
<tr>
<td>B</td>
<td>CH(_3)\text{-O-CH}_3</td>
<td>Dimethyl ether</td>
</tr>
<tr>
<td>C</td>
<td>CH(_3)\text{-COO-C}_2\text{H}_5</td>
<td>Ethyl ethanoate</td>
</tr>
</tbody>
</table>


i) Compound ‘A’ liberates hydrogen gas with sodium metal. So, it is an alcohol. Molecular formula of ‘A’ is C\(_2\)H\(_6\)O. So, it is ethyl alcohol.
CH₅CH₂OH + 2Na → 2 C₂H₅ONa + H₂↑

ii) Compound ‘A’ reacts with concentrated H₂SO₄ at 413 K to give Diethyl ether (B).

C₂H₅-OH + H₂SO₄ \[\xrightarrow{\text{Conc. H₂SO₄}}\] C₂H₅-O-C₂H₅ + H₂O

Ethanol \[\xrightarrow{413 \text{ K}}\] Diethyl ether

iii) Compound ‘A’ reacts with concentrated H₂SO₄ at 443 K to give ethene (C). ‘C’ is an unsaturated compound and hence it decolourises bromine water.

CH₃CH₂OH \[\xrightarrow{443 \text{ K}}\] CH₂=CH₂ + H₂O

Ethanol \[\xrightarrow{443 \text{ K}}\] Ethene

iv) So the organic compounds A, B, C are as follows.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CH₃-CH₂-OH</td>
</tr>
<tr>
<td>B</td>
<td>C₂H₅-O-C₂H₅</td>
</tr>
<tr>
<td>C</td>
<td>CH₂=CH₂</td>
</tr>
</tbody>
</table>

14. Organic compound ‘A’ of molecular formula C₂H₄O₂ gives brisk effervescence with sodium bicarbonate solution. Sodium salt of A on treatment with soda lime gives a hydrocarbon ‘B’ of molecular mass 16. It belongs to the first member of the alkane family. What are ‘A’ and ‘B’ and how will you prepare ‘A’ from ethanol?

Sep-2016

i) Compound ‘A’ gives brisk effervescence with sodium bicarbonate solution. So, it is a carboxylic acid. Molecular formula of ‘A’ is C₂H₄O₂. So, it is acetic acid. CH₃-COOH

CH₃-COOH + NaHCO₃ \[\xrightarrow{}\] CH₃COONa + CO₂↑ + H₂O

(A) Sodium ethanoate

ii) Sodium salt of ‘A’ ( CH₃-COONa ) on treatment with soda lime gives a hydrocarbon ‘B’ of molecular mass 16. It belongs to the first member of the alkane family. So, ‘B’ is methane.

CH₃COONa \[\xrightarrow{\text{NaOH/CaO}}\] CH₄↑ + Na₂CO₃

Methane

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CH₃-COOH</td>
</tr>
<tr>
<td>B</td>
<td>CH₄</td>
</tr>
</tbody>
</table>

iii) A can be prepared from ethanol by oxidation. Ethanol on oxidation in the presence of alkaline potassium permanganate or acidified potassium dichromate gives ethanoic acid (Acetic acid).

CH₃CH₂-OH \[\xrightarrow{2 \text{[O]}}\] \[\text{KMnO₄/ OH}^{-}\] CH₃-COOH + H₂O

Ethanoic acid

QUESTION NO.54 & 55 – PHYSICS
You have to attend one question

1. i) Space stations are used to study the effects of long-space flight on the human body. Justify.

ii) F = \(\frac{G m₁m₂}{d^2}\) is the mathematical form of Newton’s law of gravitation,

G - gravitational constant, m₁, m₂, are the masses of two bodies separated by a distance d, then give the statement of Newton’s law of gravitation. [Mar-2014, Sep-2014, Jun-2016]
i) **Space stations**
- A space station is an artificial structure designed for humans to live and work in outer space for a period of time.
- Space stations are designed for medium-term living in orbit, for periods of weeks, months or even years.
- The effects of long-space flight are,
  - **Low recycling rates**
  - **Relatively high radiation levels**
  - **Lack of Gravity**
- These problems cause discomfort and long-term health effects.
- Hence, Space stations are used to study the effects of long-space flight on the human body.

ii) **Newton law of gravitation**
Every object in the universe attracts every other object with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between them. The force acts along the line joining the centers of two objects.

\[ F = \frac{Gm_1 m_2}{d^2} \]

2. i) **Newton's first law of motion** gives a qualitative definition of force. Justify.
ii) The figure represents two bodies of masses 10 kg and 15 kg, moving with an initial velocity of 10 m/s and 5 m/s respectively. They collide with each other. After collision they move with velocities 4 m/s and 9 m/s respectively. The time of collision is 2 s. Now calculate \( F_1 \) and \( F_2 \).

\[ \text{Ans:} \]
i) **Newton's first law:** An object remains in the state of rest or of uniform motion in a straight line unless compelled to change that state by an applied unbalanced force.

**Examples:**
1. We tend to remain at rest with respect to the seat, until the driver applies brake to stop the motor car.
2. When we travel standing in a bus which begins to move suddenly. Now we tend to fall backwards.
3. A book kept on the table continues to be at the same place until and unless someone gives force to move it.
4. When a motor car make a sharp turn at high speed we tend to get through to one side.
5. If we hit the bottom coin of plies of coin on a carrom board, bottom coin moves quickly. Once lowest coin is removed there, inertia of the other coins makes them fall vertically on the table without disturbing the pipe.

ii) According to Newton second law of motion,
The force acting on B (action) \( F_1 = \text{mass of B} \times \text{acceleration on B} \).

\[ F_1 = m_2 \times \frac{(v_2 - u_2)}{t} = 15 \times \frac{(9 - 5)}{2} = 30 \text{ N} \]

The force acting on A (reaction) \( F_2 = \text{mass of A} \times \text{acceleration on A} \).
F_2 = m_1 \times \frac{(v_1-u_1)}{t} = 10 \times \frac{(4-10)}{2} = -30 \text{ N}

Therefore \quad F_1 = -F_2

Action = Reaction

3. A 5 N force acts on a 2.5 kg mass at rest, making it accelerate in a straight line.

i) What is the acceleration of the mass?

ii) How long will it take to move the mass through 20m?

iii) Find its velocity after 3 seconds.

i) Force, \( F = ma \)

\[
\text{Acceleration, } a = \frac{F}{m} = \frac{5}{2.5} = 2 \text{ ms}^{-2}
\]

ii) According to the law of equation of motion,

\[
s = ut + \frac{1}{2} a t^2
\]

\[
s = \text{displacement} = 20 \text{ m}
\]

\[
u = \text{initial velocity} = 0 \text{ ms}^{-1}
\]

\[
t = \text{time taken} = ?
\]

\[
a = \text{acceleration} = 2 \text{ ms}^{-2}
\]

\[
s = ut + \frac{1}{2} a t^2
\]

\[
20 = (0) t + \frac{1}{2} (2) t^2
\]

\[
t^2 = 20
\]

\[
t = 4.47 \text{ s}
\]

It will take 4.47 seconds to move the mass through 20m.

iii) According to the law of equation of motion,

\[
v = u + a t
\]

\[
v = \text{Final velocity} = ?
\]

\[
u = \text{Initial velocity} = 0 \text{ ms}^{-1}
\]

\[
a = \text{acceleration} = 2 \text{ ms}^{-2}
\]

\[
t = \text{time taken} = 3 \text{ s}
\]

\[
v = u + a t
\]

\[
v = 0 + 2 \times 3
\]

\[
v = 6 \text{ ms}^{-1}
\]

The velocity of the body after 3 seconds is = 6 ms\(^{-1}\)

4. State the law of conservation of momentum. Two billion people jump above the earth’s surface with a speed of 4m/s from the same spot. The mass of the earth is \( 6 \times 10^{24} \) kg. The average mass of one person is 60 kg.

i) What is the total momentum of all the people?

ii) What will be the effect of this action on the earth?

The law of conservation of momentum:

In the absence of external unbalanced force, the total momentum of a system of objects remains unchanged.

i) \( \text{Mass of the earth} = 6 \times 10^{24} \text{ kg} \)

\( \text{Velocity of the earth} = V \)
Mass of one person = 60kg 
Velocity with which he jumps = 4ms⁻¹ 
Momentum of one person = 60 x 4 = 240kgms⁻¹ 
Total momentum of 2 billion people = 2 x 10⁹ x 240 = 480 x 10⁹ kg ms⁻¹ 

ii) Total momentum before jumping = 0 (both men & the earth are at rest) 
Total momentum after jumping = Total momentum of 2 billion people + momentum of earth = 480 x 10⁹ + (6 x 10²⁴) V 

By conservation of momentum 
480 x 10⁹ + (6 x 10²⁴) V = 0 
6 x 10²⁴ x V = -480 x 10⁹ 
V = -480 x 10⁹ / 6 x 10²⁴ 
V = -8 x 10⁻¹⁴ ms⁻¹ 

Since the velocity (due to the impact of jumping) of the earth is very less, the effect of the action on the earth is almost negligible. Nothing will happen to the earth due to this action. 

5. State Newton’s law of gravitation. Write an expression for acceleration due to gravity on the surface of the earth. If the ratio of acceleration due to gravity of two heavenly bodies is 1:4 and the ratio of their radii is 1:3, what will be the ratio of their masses? 
i) Newton’s law of Gravitation: 
Every object in the universe attracts every other object with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between them. 

\[ F \propto \frac{m_1 m_2}{d^2} \]

ii) Acceleration due to gravity on the surface of the earth, \( g = \frac{GM}{R^2} \)
Where, \( G = \) Universal gravitational constant \( M = \) mass of earth \( R = \) Radius of earth 

iii) \( g_1 = \frac{GM_1}{R_1^2} \) & \( g_2 = \frac{GM_2}{R_2^2} \)
\( M_1 = \frac{g_1 R_1^2}{G} \) & \( M_2 = \frac{g_2 R_2^2}{G} \)
\( \frac{M_1}{M_2} = \frac{g_1 R_1^2}{g_2 R_2^2} \)
\( \frac{M_1}{M_2} = \frac{1}{4} \left( \frac{R_1}{R_2} \right)^2 = \frac{1}{36} \)
Ratio of masses is 1 : 36 

6. A bomb of mass 3 kg, initially at rest, explodes into two parts of 2 kg and 1 kg. The 2 kg mass travels with a velocity of 3 m/s. At what velocity will the 1 kg mass travel? 
Mass of bomb, \( m = 3 \) kg 
Initial velocity, \( u = 0 \) ms⁻¹
Mass of first part, \( m_1 \) = 2 kg
Final velocity of first part, \( v_1 \) = 3 \( \text{ms}^{-1} \)
Mass of second part, \( m_2 \) = 1 kg
Final velocity of second part, \( v_2 \) = ?

According to the law of conservation of momentum,
Initial momentum = Final momentum
\[ m u = m_1 v_1 + m_2 v_2 \]
\[ 3 \times 0 = 2 \times 3 + 1 \times v_2 \]
\[ v_2 = -6 \text{ms}^{-1} \]

The velocity of second part of bomb (1 kg mass) is 6 \text{ms}^{-1} in the opposite direction.

7. Two ice skaters of weight 60 kg and 50 kg are holding the two ends of a rope. The rope is taut. The 60 kg man pulls the rope with 20 N force. What will be the force exerted by the rope on the other person? What will be their respective acceleration?

i) Mass of person I, \( m_1 \) = 60 kg
Mass of person II, \( m_2 \) = 50 kg.
Force applied by person I, \( F_1 \) = 20 N
Force exerted by the rope on person II, \( F_2 \) = 20 N

ii) Acceleration of person I, \( a_1 \) = \( \frac{F_1}{m_1} \)  ∴ \( F = ma \)
\[ \frac{20}{60} = 0.33 \text{ms}^{-2} \]

Acceleration of person II, \( a_2 \) = \( \frac{F_2}{m_2} \)
\[ \frac{20}{50} = 0.4 \text{ms}^{-2} \]

The two ice skaters’ respective accelerations are 0.33 \text{ms}^{-2} and 0.4 \text{ms}^{-2}

QN NO.55  UNIT-17 MAGNETIC EFFECT OF ELECTRIC CURRENT AND LIGHT

1. a) Draw the given diagram and label the following in the diagram.
   i) Incident ray
   ii) Refracted ray
   iii) Emergent ray
   iv) Angle of refraction
   v) Angle of deviation
   vi) Angle of emergence

b) The refractive index of diamond is 2.42. What is the meaning of this statement in relation to the speed of light?

 a)
b) Refractive index of diamond is 2.42. This means that, light travels 2.42 times faster in air than in diamond. (or) Speed of light in diamond will reduce by a factor 2.42 as compared to its speed in air.

\[
\text{Refractive index of diamond} = \frac{\text{Speed of light in air}}{\text{Speed of light in diamond}}
\]

\[
\therefore \text{Speed of light in diamond} = \frac{\text{Speed of light in air}}{\text{Refractive index of diamond}}
\]

\[
\text{Speed of light in diamond} = \frac{3 \times 10^8}{2.42} = 1.24 \times 10^8 \text{ m/s}
\]

The speed of light in diamond is less than speed of light in air.

2. i) Redraw the diagram  ii) This diagram represents

   iii) Label the parts of the diagram
   iv) Mention the principle used in the device denoted by this diagram [June-2013, 2016, Mar-2014, 2016]

**Ans:**

i) [Diagram of AC generator]

ii) A.C. Generator

iii) \( S_1, S_2 \) Slip rings

   \( B_1, B_2 \) Carbon brushes

   NS Magnetic field

   ABCD Armature

   R Resistor

iv) Electromagnetic induction (Fleming’s Right hand rule)

3. i) Find the nature, position and magnification of the image formed by a convex lens of focal length 10cm, If the object is placed at a distance of a) 15 cm b) 8 cm

   ii) Which of the above represents the use of convex lens in a) A film projector b) The magnifying glass used by palm reader

**Ans:**

i) a) The object is placed at a distance of 15 cm

\[ u = -15 \text{ cm}, \quad f = +10 \text{ cm}, \quad v = ? \]

Lens formula:

\[
\frac{1}{u} = \frac{1}{f} + \frac{1}{v}
\]

\[
\frac{1}{15} = \frac{1}{10} + \frac{1}{v}
\]

\[
\frac{1}{v} = \frac{1}{30}
\]

\[
v = 30 \text{ cm}
\]
10th Science

Five Mark Questions

\[
\frac{1}{v} = \frac{1}{10} + \frac{1}{-15} = \frac{1}{10} - \frac{1}{15} = \frac{3 - 2}{30} = \frac{1}{30}
\]

\( v = 30 \text{ cm} \)

Magnification \( = \frac{v}{u} = \frac{30}{-15} = -2 \)

<table>
<thead>
<tr>
<th>Position of the object</th>
<th>Position of the image</th>
<th>Relative size of the image</th>
<th>Nature of the image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between ( F_1 ) and 2( F_1 ) (15 cm)</td>
<td>Beyond 2( F_2 ) (30 cm from optical centre of lens)</td>
<td>Enlarged (2 times larger than the object)</td>
<td>Real and inverted</td>
</tr>
</tbody>
</table>

i) b) The object is placed at a distance of 8 cm

\( u = -8 \text{ cm}, \quad f = +10 \text{ cm}, \quad v = ? \)

Lens formula:

\[
\frac{1}{f} = \frac{1}{v} - \frac{1}{u}
\]

\[
\frac{1}{v} = \frac{1}{f} + \frac{1}{u}
\]

\[
\frac{1}{v} = \frac{1}{10} + \frac{1}{-8}
\]

\[
= \frac{1 - 1}{10 - 8} = \frac{4 - 5}{40} = -\frac{1}{40}
\]

\( v = -40 \text{ cm} \)

Magnification \( = \frac{v}{u} = \frac{-40}{-8} = 5 \)

<table>
<thead>
<tr>
<th>Position of the object</th>
<th>Position of the image</th>
<th>Relative size of the image</th>
<th>Nature of the image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between ( F_1 ) and optical centre ( O ) (8 cm)</td>
<td>On the same side of the lens as the object (40 cm from optical centre of lens)</td>
<td>Enlarged (5 times larger than the object)</td>
<td>Virtual and erect</td>
</tr>
</tbody>
</table>

ii) a) Film projector:

Object is at 15 cm (The first convex lens - between \( F \) and 2\( F \))

b) The magnifying glass used by palm reader:

Object is at 8 cm (The second convex lens - between \( F \) and \( O \))

4. An object of 5 cm tall is placed at a distance of 10 cm from a concave mirror of radius of curvature 30 cm

i) Find the nature, position and size of the image

ii) Draw the ray diagram to represent the above case.

i) \( R = -30 \text{ cm}, \quad f = \frac{R}{2} = -\frac{30}{2} = -15 \text{ cm}, \quad u = -10 \text{ cm}, \quad v = ? \)

Mirror formula:

\[
\frac{1}{f} = \frac{1}{v} + \frac{1}{u}
\]

\[. \quad \frac{1}{v} = \frac{1}{f} - \frac{1}{u}
\]
\[ \frac{1}{-15} - \frac{1}{-10} = \frac{1}{15} + \frac{1}{10} \]
\[ = \frac{1}{10} - \frac{1}{15} = \frac{3-2}{30} = \frac{1}{30} \]

\[ \nu = 30 \text{ cm} \]

Magnification produced by spherical mirror
\[ m = -\frac{\nu}{u} = \frac{-30}{-10} = \frac{-3}{-1} = 3 \]

Height of the object = 5 cm
\[ \therefore \text{Height of the image} = \text{height of the object} \times \text{magnification} = 5 \times 3 = 15 \text{ cm}. \]

So Height of the image = 15 cm

<table>
<thead>
<tr>
<th>Position of the object</th>
<th>Position of the image</th>
<th>Size of the image</th>
<th>Nature of the image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between P and F (8 cm)</td>
<td>Behind the mirror (30 cm from pole of the mirror)</td>
<td>Enlarged (15 cm tall)</td>
<td>Virtual and erect</td>
</tr>
</tbody>
</table>

ii) Ray diagram

5. The optical prescription of a pair of spectacle is Right eye : \(-3.5\) D Left eye : \(-4.00\) D

i) Name the defect of the eye

ii) Are these lenses thinner at the middle or at the edges?

iii) Which lens has a greater focal length? [Sep-2016]

i) Power of concave lens is negative. So, the defect of the eye is myopia or near-sightedness

ii) Concave lenses are thinner at the middle.

iii) Power of lens, \( P = \frac{1}{f} \)

Focal length of Right eye spectacle, \( f = \frac{1}{P} = \frac{1}{-3.5} = -0.286 \text{ m} \)

Focal length of Left eye spectacle, \( f = \frac{1}{P} = \frac{1}{-4} = -0.25 \text{ m} \)

So, the Right eye lens has greater focal length.
OUR PRODUCTS

✧ 10th Std - All Subjects with Practice Book (EM & TM)
✧ 12th Std - English, Maths & Chemistry
✧ 9th Std - English with Activity Book
✧ TET - English for Competitive Exams with Practice Book
✧ Verbs and Tenses - Mini Book

For Orders Contact: 9787609090, 9787201010

WAY TO SUCCESS PUBLICATIONS

Plot No. 24, Ramamoorthi Nagar, Old Karur Road,
Melachinthamani, Trichy – 620 002.