Grade 10 Telangana Science 2023

Part -A

Section – I

Instructions:

(i) 3 very short answer questions are there in this Section-I.

(ii) Answer all the questions. Each answer carries 2 marks.

(iii) Write answers to each question in 3 to 4 sentences.

Q1. Mention uses of Nanotubes which is an allotropy form of carbon in day-to-day life.

Solution:

Carbon nanotubes are utilized in creating biosensors and electrochemical sensors due to their unique properties. They are also employed in manufacturing electrodes for studying electrochemical reactions, thanks to their exceptional electrical conductivity and performance.

Q2. List out the materials required in the experiment " Reaction of oxide with metals".

Solution:

Materials needed for the experiment "Reaction of oxide with metals" include a metal sample (such as magnesium) and a heating source like a spirit lamp or Bunsen burner.

Q3. What will happen if household electric appliances are connected in series connection?

Solution:

Household appliances are connected in parallel circuits because a parallel connection ensures the same voltage across all appliances. It also allows appliances to function independently, as the current divides between them. In a series connection, the current flows through all the appliances sequentially, so if one appliance stops working, the rest will also stop functioning.

SECTION – II

Instructions:

(i) 3 short answer questions are there in this Section-II.

(ii) Answer all the questions. Each answer carries 4 marks.

(iii) Write answers to each question in 5 to 6 sentences.

Q1. Write the uses of washing soda in day-to-day life.

Solution:

The various uses of washing soda in daily life are:

(i) It serves as a cleaning agent for domestic purposes.

(ii) It helps soften hard water and regulates water pH.

(iii) It is used in the manufacture of glass.

(iv) Due to its detergent properties, it is a key ingredient in many dry soap powders.

(v) It is also utilized in photography, textiles, and paper industries.

Q2. Observe the table answer the following questions.

Atomic number	11	12	13	14	15	16	17
Name of the elements	Na	Mg	Al	Si	P	S	Cl

(i) Which period does the elements belongs?

(ii) Mention the non-metals in the above.

(iii) Which element has more atomic radius in the above?

(iv) From left to right how is the metallic character changes?

Solution:

The given elements belong to the 3rd period of the periodic table.

The non-metals in the list are phosphorus (P), sulfur (S), and chlorine (Cl)

Sodium (Na) has the largest atomic radius among these elements.

As we move from left to right across a period, the metallic character decreases due to an increase in effective nuclear charge, making it harder for elements to lose electrons.

Q3. During the Sunset and Sunrise, the Sun appears red. Why?

Solution:

The Sun appears red during sunrise and sunset due to atmospheric scattering. Red light has the longest wavelength and is scattered the least by air molecules. As sunlight travels a longer path through the atmosphere during these times, most of the shorter wavelengths (blue and violet) are scattered away, leaving the red light to reach our eyes.

SECTION - III

Instructions:

(i) 3 Essay type answer questions are there in this Section-III.

(ii) Answer all the questions. Each answer carries 6 marks.

(iii) Write answers to each question in 8 to 10 sentences.

Q1. List out the material required to observe the types of images and measuring the object distance and image distance from concave mirror. Explain the experimental procedure.

Solution:

The materials required to observe the object distance and image distance from a concave mirror are:

A candle, a sheet of paper, a concave mirror, a V-stand, and a measuring scale.

The experimental procedure is as follows:

Position the concave mirror on a V-stand, align a candle in front of it, and place a sheet of paper to act as a screen.

Keep the candle at different distances from the mirror (10 cm to 80 cm) along the axis

S. No.	Position of the candle	Position of image	bigger/smaller than object	Inverted/erect	Real/Virtual
1.	Between the mirror and *F*	Behind the mirror	Enlarged	Erect	Virtual
2.	On focal point	At infinity	Highly enlarged	Inverted	Real
3.	Between F and C	Beyond C	Enlarged	Inverted	Real
4.	On C	On C	Same size	Inverted	Real
5.	Beyond C	Between F and *C*	Diminished	Inverted	Real

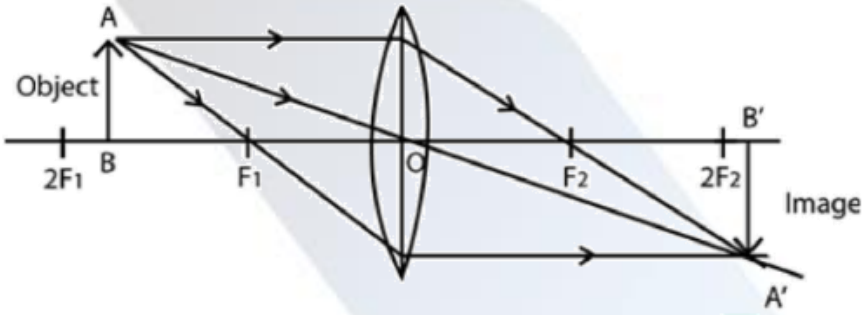
and by moving the paper find the position where we get sharp image on paper.

Note down the observations in the table.

Q2. Draw the ray diagram to form the image when the object is placed between F and C on the principle axis of a Convex lens. Write the characteristics of the image formed.

Solution:

Taking C as $2f_1$, then placing the image between f and $2f_1$

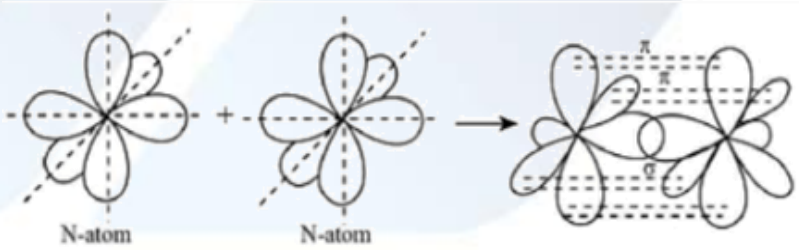


The image formed is: Enlarged, Real and Inverted.

Q3. Explain the formation of N_2 molecules by using Valence bond theory.

Solution:

The electronic configuration of nitrogen(N) is 1 $s^2$2 $s^2$2p_x ^{1}2p_y ^{1}2p_z ^{1}. The p_x orbital of one ' N ' atom overlaps the ' p_x ' orbital of the other ' N ' atom giving $\sigma p_x - p_x$ bond along the internuclear axis. The p_y and p_z orbital of the other ' N ' atom laterally, respectively perpendicular to inter-nuclear axis forming $\pi p_y - p_y$ and $\pi p_z\ p_z$ bonds. This results in a triple bond between the two nitrogen atoms in N_2.



Part – B

Section I

Instructions:

(i) This section contains 3 very short answer questions.

(ii) Answer ALL the questions.

(iii) Write the answers in 3-4 sentences.

(iv) Each question carries 2 marks.

Q1. Write two materials required to conduct an experiment to prove "Sunlight is essential for Photosynthesis".

Solution:

Two materials needed to conduct an experiment to demonstrate that sunlight is essential for photosynthesis are:

(i) Black paper to block sunlight from a part of the leaf.

(ii) Iodine solution to test for the presence of starch in the leaf.

Q2. Name two fossil fuels that are used in daily life.

Solution:

Two commonly used fossil fuels in daily life are:

(i) Liquefied Petroleum Gas (LPG) for cooking and heating.

(ii) Coal for generating electricity and industrial purposes.

Q3. What will happen if there is no mucus in the Oesophagus?

Solution:

If there is no mucus in the oesophagus, the cells will become dry, leading to difficulty in the smooth passage of food. This can also affect the proper functioning of the oesophageal muscles, causing discomfort and potential obstruction.

Section-II

Instructions:

(i) This section contains 3 short answer questions.

(ii) Answer ALL the questions.

(iii) Write the answers in 5-6 sentences.

(iv) Each question carries 4 marks.

Q1. Write four differences between arteries and veins.

Solution:

Arteries	Veins
i. Arteries primarily carry oxygenated blood, except for pulmonary arteries.	i. Veins primarily carry deoxygenated blood, except for pulmonary veins.
ii. They have three distinct layers that are thick, rigid, and highly muscular.	ii. They have three distinct layers that are thinner and less muscular.
iii. Arteries are located deep within the body.	iii. Veins are located closer to the skin.
iv. Valves are absent.	iv. Valves are present to prevent backflow of blood.

Q2. Name any four secondary metabolites that are used in daily life and write their uses.

Solution:

Secondary metabolites are chemical compounds produced by plants during later stages of growth, often in small quantities. These compounds have various applications in daily life. Examples include:

(i) **Caffeine**: Acts as a stimulant for the central nervous system.

(ii) **Resin**: Used in the production of varnishes.

(iii) **Morphine and Cocaine**: Serve as pain relievers.

(iv) **Latex**: Source of natural rubber, used for making gloves, catheters, balloons, and adhesives.

Q3. Observe the following table.

Vitamin	**Deficiency disease**	**Symptoms**
Thiamin (B1)	Beri beri	Vomitings, difficulty in breathing.
Retinol (A)	Eye, Skin diseases	Night blindness, Cornea failure, Xerophthalmia.
Tocoferol (E)	Fertility related disorders	Sterility in males, abortions in females.

Niacin(B3)	Pellagra	Dermatitis, diarrhoea, loss of memory.

Answer the following questions based on the given table.

(i) Name two water soluble vitamins from the table.

Solution:

Vitamins-B1 and Vitamins-B3

(ii) Write two fat soluble vitamins from the table.

Solution:

Vitamins A and E

(iii) Which vitamin from the given table is called vitamin 'E?

Solution:

Tocoferol

(iv) Write any one deficiency disease causes due to deficiency of vitamin 'A'

Solution:

Night blindness

Section-III

Instructions:

(i) This section contains 3 essay type questions.

(ii) Answer any TWO questions.

(iii) Write the answer in 8-10 sentences.

(iv) Each question carries 6 marks.

Q1. Explain the various stages of Mitosis.

Solution:

Mitosis, a term introduced by W. Fleming, is a type of cell division where a single cell divides into two genetically identical daughter cells, each containing the same number of chromosomes as the parent cell.

Stages of Mitosis

The process of mitosis is divided into the following phases:

1. Interphase

Interphase is the preparatory phase before mitosis.

During this stage, DNA replication, protein synthesis, and duplication of cellular organelles occur.

It represents the time between the completion of one mitotic cycle and the start of the next.

2. Karyokinesis

This refers to the division of the nucleus and is further divided into the following stages:

a) Prophase

Chromosomes condense into distinct coiled threads, becoming highly visible.

Each chromosome comprises two identical chromatids joined by a centromere.

The nuclear membrane and nucleolus disintegrate.

The spindle apparatus begins to form.

b) Metaphase

Chromosomes align at the equatorial plate.

Spindle fibers attach to the centromeres, ensuring proper segregation.

c) Anaphase

Centromeres split, separating the chromatids, which are now called daughter chromosomes.

Daughter chromosomes move to opposite poles due to the contraction of spindle fibers.

d) Telophase

Daughter chromosomes uncoil to form a chromatin network.

The nuclear membrane reappears around the chromatin, forming two nuclei.

Spindle fibers and astral rays (in animal cells) disintegrate, marking the end of nuclear division.

3. Cytokinesis

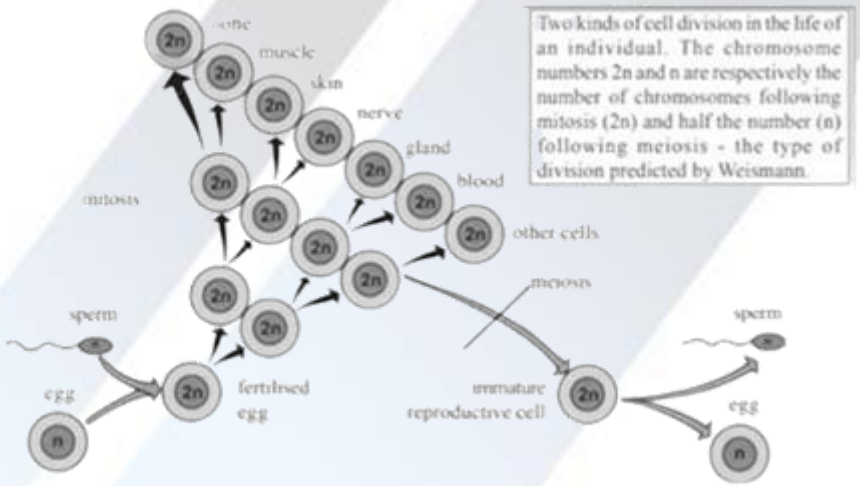
This stage involves the division of the cytoplasm.

Two distinct daughter cells are formed, each with a nucleus and identical genetic material.

Through these stages, mitosis ensures equal distribution of genetic material, enabling growth, repair, and reproduction in multicellular organisms.

Q2. Draw a labeled diagram of a Nerve cell and explain the structure.

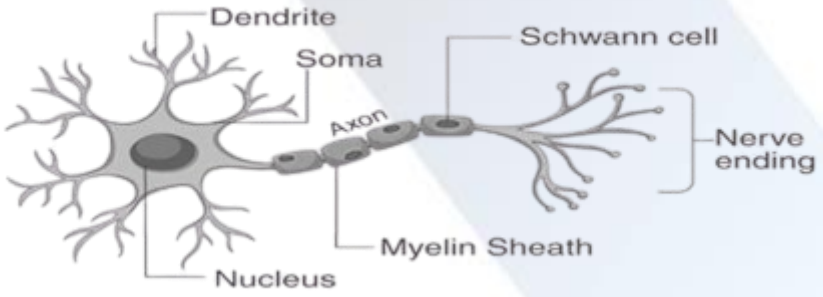
Solution:



Neurons are specialized cells of the brain and nervous system. Each neuron consists of two main parts: the cell body and the axon.

The cell body, also known as the cyton, contains a prominent nucleus and Nissl's granules. Extending from the cell body are short, brush-like structures called dendrites, which help in receiving signals. The axon is a long, slender projection of the cell body, ending in a cluster of branches. It facilitates the transmission of nerve

signals. The axon is insulated by a fatty layer called the myelin sheath, which aids in faster signal transmission. However, there are gaps in the myelin sheath, known as nodes of Ranvier, which play a role in speeding up nerve impulses. At the terminal end of the axon are nerve fibers that transmit signals to other neurons, muscles, or glands. This unique structure enables neurons to efficiently transmit signals throughout the nervous system.



Q3. Explain the procedure and results of the experiment that proves "Heat is released during Respiration".

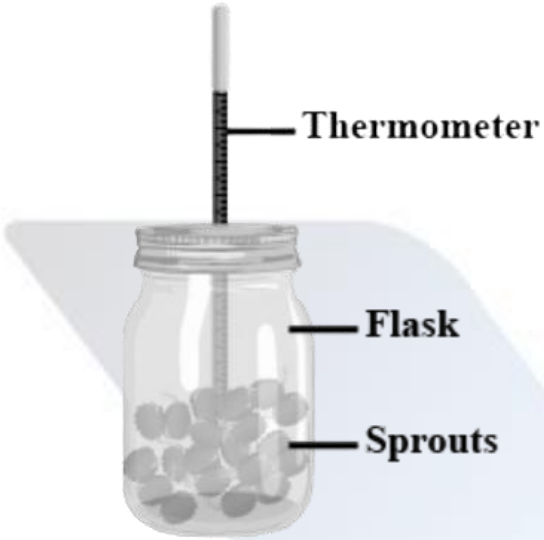
Solution:

Procedure:

a. Take a handful of sprouts and place them in a thermos flask.
b. Prepare a cork made of thermocol, rubber, or any suitable material, with a hole bored into it to insert a thermometer.
c. Ensure the thermometer's bulb is submerged within the sprouts.
d. Seal the flask tightly using the cork to prevent heat loss.
e. Record the temperature at two-hour intervals over a 24-hour period.

Result:

During respiration, glucose molecules break down, releasing energy in the form of heat. This heat causes a rise in temperature inside the flask, which is observed as an increase in the thermometer's mercury level. This experiment demonstrates that heat is released during respiration.


Thermometer
Flask
Sprouts