Science

SECTION – A

Section - A consists of 24 questions.

The first attempted 20 questions would be evaluated.

1. ANSWER: [B]
Explanation: Any substance that contains only one type of particles (example, molecules, or atoms etc.) is said to be a pure substance. Among the given options only distilled water has one type of particles (that is H_2O molecules).

2. ANSWER: [C]
Explanation: Sulphur has (atomic number = 16) exist as a gas at room temperature and hence, it is a non-metal.

3. ANSWER: [A]
Explanation: Ammonia contains nitrogen and hydrogen as NH_3. Both are non-metals. Whereas rust contains iron, quicklime has calcium and sodium chloride and sodium metal in its composition.

4. ANSWER: [C]
Explanation: Salt solution is made by mixing salt (NaCl) in water. It is homogeneous mixture because its constituents are uniformly distributed throughout, that is without any clear boundary of separation.

5. ANSWER: [B]
Explanation: Lateral meristematic tissues, creates when girth of the steam increases. This increase in the diameter and girth of the plant and is called secondary growth. The apical Meristem is situated at the growing tips of stems, root and also at the apices of leaf. They bring about elongation that is increase in height (primary growth) of the plant. Intercalary meristem are located at base of leaves and internodes and produces an increase in the length of an organ.

6. ANSWER: [B]
Explanation: Depending on the region where the meristematic tissues is present, they are classified as apical, lateral and intercalary.

7. ANSWER: [A]
Explanation: Collenchyma consists of living cells and is characterized by the presence of cellulose. It is a mechanical tissue in young dicot stems and provides mechanical support and elasticity. It provides great tensile strength along with flexibility to the organs in which it is found. This allows for easy bending of different parts of the plant, mainly without breaking the young growing stem.

8. ANSWER: [A]
Explanation: The husk of the coconut is made up of sclerenchymatous tissues.

9. ANSWER: [B]
Explanation: Tracheids and vessels are the xylem elements and are related to the transport of water. They are long tube-like structures with partially or completely breached walls to form water pipes (in vehicles) and pits in the cell wall (in tracheids) to conduct water. Sieve tubes are thin tube-like structures whose end walls are perforated with many holes and are called sieve plates. They are phloem elements and are the main food carrier elements. Associate cells contain many mitochondria and ribosomes and are the supporting units of sieve tubes.

10. ANSWER: [B]
Explanation: Phloem fibers are thick-walled, long spindle-shaped dead cells with a narrow lumen. They provide mechanical support to the tissue. Phloem parenchyma is the thin-walled living cells of the parenchyma. They have two functions, as (i) storage and (ii) lateral food conduction.

11. ANSWER: [C]
Explanation: In the year 1670, Dutch biologist Anton van Leeuwenhoek discovered the living cell when he looked at pond water under a microscope, which is made up of lenses.

12. ANSWER: [A]
Explanation: True, Rudolf Virchow modified the cell theory in 1855. He gave the postulelate, "Omnis cellula-e-cellula", which means, a new cell arise from pre-existing cells.

13. ANSWER: [B]
Explanation: All we know that every cell performs in our body. And after being cell dead it throws out from the body. Remember, shape & size of cells are related to the specific function as they perform.

14. ANSWER: [A]
Explanation: The plasma membrane allows the entry and existence of certain materials in and out of cells. Hence, it is called selectively permeable membrane.

15. ANSWER: [A]
Explanation: Absolutely true, Osmosis, is the movement of water (molecules) by a selectively permeable membrane. It is the passage of water from an area of high-water concentration to an area of low water concentration through a semi-permeable membrane.

16. ANSWER: [B]
Explanation: The flexibility of the cell membrane enables the cell to swallow food and other material from its external environment by endocytosis. Amoeba obtains its food through such processes.

17. ANSWER: [D]
Explanation: The displacement of an object can be less than or equal to the distance covered by the object because the magnitude of the displacement is not equal to the distance. This can happen if the motion is along a straight line without any change in direction.
So, the ratio of displacement to distance is always equal to or less than one.

18. ANSWER: [A]
Explanation: Distance, odometer is an instrument used for measuring the distance travelled by a vehicle such as a bicycle or car.

19. ANSWER: [A]
Explanation: An object having uniform motion has a straight-line path.

20. ANSWER: [D]
Explanation: The average speed of an object is greater than or equal to the magnitude of the average velocity in a given time interval.

21. ANSWER: [B]
Explanation: False, a force can change the following factors
(i) Speed of object, (ii) direction of motion, (iii) size, and shape of object.

22. ANSWER: [C]
Explanation: Lets take an example, a cricket ball has more inertia because it has more mass (it is quite heavy). On the other hand, a rubber ball has less inertia because it has less mass (it is light). Hence, the inertia of the object depends on its mass.

23. ANSWER: [A]
Explanation: True, inertia increases with increase in mass and decreases with decrease in mass. So, a heavy object has more inertia than a lighter one.

24. ANSWER: [A]
Explanation: The quantity of motion possessed by an object is called the momentum of the object.

SECTION - B
Section - B consists of 24 questions (Sl. No. 25 to 48).
The first attempted 20 questions would be evaluated.

25. ANSWER: [B]
Explanation: False, Displacement is the length of shortest path between initial and final position. So, its magnitude can never be greater than the distance travelled by it.

26. ANSWER: [C]
Explanation: Speedometer is used to measure instantaneous speed.

27. ANSWER: [A]
Explanation: Only magnitude is required to specify the speed of an object as it is a scalar quantity.

28. ANSWER: [D]
Explanation: When the velocity of an object decreases with time, it is called retardation or de-acceleration or negative acceleration.

29. ANSWER: [B]
Explanation: A particle cannot be accelerated if its velocity is constant.

30. ANSWER: [A]
Explanation: The area under u-t graph gives the value of distances or magnitude displacement.

31. ANSWER: [B]
Explanation: Gold, silver and bromine are the pure substances because they are made up of only a single type of constituent particles.

32. ANSWER: [A]
Explanation: In aquatic plants, large air cavities are present in the parenchyma that buoys up to help the plants swim. This type of parenchyma is called aerenchyma. It is present in hyacinth.

33. ANSWER: [B]
Explanation: The nucleus was discovered by Robert Brown (Scottish botanist and Paleo botanist) in 1831. The nucleoplasm and cytoplasm of a living cell together form the protoplasm. In 1839, Purkinje coined the term protoplasm for the fluid contents of the cell.

34. ANSWER: [C]
Explanation: The Displacement, is the shortest distance between two points. Displacement can be positive, negative or zero, while distance is always positive.

35. ANSWER: [C]
Explanation: Force is required to change the position of the body. In a uniform motion the body moves at a constant speed so the acceleration must be zero.

36. ANSWER: [A]
Explanation: Sodium chloride is a pure substance because it has fixed composition(1:1) and other given options are mixture.

37. ANSWER: [B]
Explanation: Germanium is not a compound; it is a metalloid. It has intermediate properties between those of metals and non -metals.

38. ANSWER: [B]
Explanation: The metal present in quicklime is calcium. The chemical formula of quicklime or calcium oxide CaO.

39. ANSWER: [C]
Explanation: Meristematic tissues is present in the growing regions of plants, and consists of actively dividing cells e.g., the tips of roots and stems. The cells of meristematic tissues are round, oval, polygonal or rectangular. They are closely packed without intercellular spaces, have thin cellulose walls, dense cytoplasm and prominent nuclei.

40. ANSWER: [A]
Explanation: Cells of intercalary meristems are very active, they have dense cytoplasm, thin cellulose walls, and prominent nuclei. They lack vacuoles.

41. ANSWER: [A]
Explanation: Parenchyma cells make up the bulk of the plant body. Its cells are alive and have the power to divide. The cells are round or isodiametric, that is, evenly spaced on all sides. Cells are oval, round, polygonal or elongated with a thin cell wall. It encloses a dense cytoplasm, containing small nuclei and enclosing the large central vacuole.

42. ANSWER: [A]
Explanation: Purkinje is 1839 coined the term 'protoplasm' for the fluid substance of the cell.

43. ANSWER: [C]
Explanation: Plasma membrane or cell membrane is the outermost covering of the cell that separates the content of the cell from its external environment.

44. ANSWER: [D]
Explanation: Presence of lipids and proteins as phospholipids provide flexibility plasma membrane. This helps cell in engulfing food and other materials from external environment.

45. ANSWER: [B]
Explanation: When resultant force acting on a body is zero, then body will be in equilibrium.

46. ANSWER: [B]
Explanation: False, a force can change following factors:
i) Speed of object, ii) Direction of motion and iii) Size and shape of the object.

47. ANSWER: [B]
Explanation: False, as momentum = Mass x Velocity
So, it depends both mass and velocity of the body.

48. ANSWER: [A]
Explanation: Milk is a colloid with small particles of butterfat suspended through the liquid.

SECTION – C
Section - C consists of three Cases followed by questions. There are a total of 12 questions in this section. *The first attempted 10 questions would be evaluated.*

Case – 1:
49. ANSWER: [B]
Explanation: In second case, the particles settle down which were suspended throughout the bulk and the path became not visible.

50. ANSWER: [C]
Explanation: When X is added water then the solution becomes suspension which is a heterogeneous mixture.

51. ANSWER: [C]
Explanation: Starch solution is a colloidal solution; hence, it will show Tyndall effect.

52. ANSWER: [D]
Explanation: When the light passes through the solution, then scattering of light by colloidal particles is observed and path of light beam becomes visible. This phenomenon is known as Tyndall effect

Case – 2:
53. ANSWER: [A]
Explanation: Plant and animal cells are different as plant cells possess cell wall, plastids and a large vacuole, which are absent in animal cells.

54. ANSWER: [D]
Explanation: Chloroplasts are pigment containing plastids. They are important for photosynthesis in plants. They contain various yellow or orange pigments in addition to chlorophyll.

55. ANSWER: [D]
Explanation: Chloroplasts are involved in trapping light energy for photosynthesis. Leucoplast are colourless plastids that stores, material such as starch, oil and protein granules. Chromplasts are the coloured plastids that imparts colours to the plant.

56. ANSWER: [A]
Explanation: The central vacuole of some plant cells can occupy 50-90% of the cell volume.

Case – 3:
57. ANSWER: [A]
Explanation: More force is needed to stop a cricket ball (which has more mass) and less force is needed to stop a tennis ball (which has less mass).
The force required to stop a moving ball is proportional to mass (m) and velocity (v), i.e., momentum = m x v.
Therefore, a faster ball will require more force.

58. ANSWER: [B]
Explanation: As momentum,
p = m x v
= 0.2 x 400
= 2/10 x 400
= 80 kg m/s

59. ANSWER: [B]
Explanation: Unit of momentum is kg-m/s

60. ANSWER: [C]
Explanation: We know that acceleration is related to mass by the expression,
a = F/m.
Now, if both force and mass are doubled,
Acceleration
a_1 = 2F/2m
(i.e., acceleration will, remain the same).