CONTENTS

CHAPTER 1

MATTER IN OUR SURROUNDINGS

1. What is a matter?

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2. Sodium chloride and sugar have same appearance. Are they same or different?

   ----

3. All substances around us are alike. How?

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4. How can we say that air is a matter?

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5. State the characteristics of matter?

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6. What are the intensive properties of matter?

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7. What are the extensive properties of matter?

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8. State the characteristics of particles of matter.

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9. What is the effect of temperature on a matter?

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10. The smell of hot sizzling food reaches us several metres away. Why?

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11. What is diffusion?

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12. If a bottle of perfume is opened in one corner of a room, it immediately spreads throughout the room. Why?

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13. Name the three states of matter with examples.

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14. State the characteristics of solids.

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15. What are the characteristics of liquids?

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16. What are the characteristics of gases?

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17. What are fluids?

_____

_____

_____

_____

18. Which of the following substances is most compressible? CO_2, H_2O, NaCl.

_____

_____

19. Which property of a gas results in steady pressure of the gas ?

_____

_____

_____

_____

20. In which of the following substances, weakest inter molecular force is expected: H_2O, CH_3OH,

_____

_____

_____

_____

21. One gas mixes with another gas easily. What is this property called ?

_____

_____

_____

_____

22. Describe briefly   (i) Melting point and   (ii) Boiling point.

(i)_____

_____

_____

_____

(ii)_____

_____

_____

_____

23. How would you find out whether a sample of sodium chloride is pure or impure ?

_____

_____

_____

24. How will you find out whether a sample of water is pure or impure ?

_____

_____

_____

_____

25. Why do solids have a fixed shape and gases have neither a fixed shape nor a fixed volume?

_____

26. What is Vaporization ?

27. What is Sublimation ?

28. What is Condensation ?

29. What is Deposition ?

30. What is Liquefaction ?

31. What is Solidification ?

32. What is difference between vapour and gas.

33. Why do the three states of matter differ ?

34. Why does the temperature remain constant until whole of the solid changes into liquid, though the heat energy is constantly supplied ?

35. Why does the temperature remain constant during boiling though heat is constantly supplied ?

36. Why does a gas fill a vessel completely ?

37. How does the state of matter changes from solid to liquid and then to gas on heating ?

38. Why evaporation is called surface phenomenon?

39. List two processes from which it may be concluded that the particles of a gas move continuously.

40. At what temperature does solid ice and liquid water co-exist together?

41. What is common among the three states of matter?

42. Which property of gas is used in supplying oxygen cylinders to hospitals?

43. A substance x was highly compressible and could easily be liquefied. it could also take the shape of the container. Predict the nature of the substance.

44. What is the state of water at 100 degree celsius, zero degree celsius and 4 degree celsius?

45. Can a liquid turn into vapor without heating?

46. What do you mean by Latent heat of Fusion?

47. What is compressibility? How it is negligible in solids?

48. Two cubes of ice are pressed hard between two palms. After releasing the pressure, the cubes join together. Why?

49. Explain why ice has lower density than water?

50. Give one similarity between a liquid and a gas and one dissimilarity.

51. What property of gas is utilized when natural gas is supplied for vehicles.

52. What are 'intermolecular forces'? How are these related to the three states of matter ?

53. Separate the following substances in groups of high and low intermolecular force: Ice, sulphur vapour, nitrogen, sugar, copper, air, salt, plastic.

54. Which of the following substances you expect strongest and in which weakest intermolecular force: Water, alcohol, sugar, sodium chloride, carbon dioxide.

55. Why are gases compressible but liquids not ?

56. Compare the process of boiling and vaporization.

57. How is pressure developed in a container full of a gas ?

58. What are the applications of interconversion of states of matter ?

59. What happens to a gas if its inter molecular space is reduced ?

60. Explain how lumps of ice are more effective cooling than water at 273K.

61. Explain CNG and LPG.

62. Arrange the following substances in increasing order of force of attraction between the particles.
(i) milk (ii) salt (iii) oxygen

63. Why is sponge a solid though compressible?

64. Write one important characteristic of matter.

65. Why does a desert cooler cool better in a hot dry day?

66. Convert: (a) 25°C into kelvin scale (b) 500 K into celsius scale

(a)

(b)

67. Why does the smell of hot sizzling food reach you several metres away but to get the smell from cold food you have to go close?

68. What is the term used for change of solid state to liquid state?

69. Name the temperature at which solid and liquid states of matter can coexist.

70. Define evaporation.

71. "The wool being knitted into a sweater is a physical change." Justify the statement.

72. Mention two ways to liquefy atmospheric gases.

73. What is the value of boiling point of water on Kelvin Scale of temperature?

74. What is dry ice?

75. (a) Dry ice is compressed at high pressure. What happens when pressure is released?
    (b) Suggest a method to liquefy atmospheric gases.

    (a)

    (b)

76. (a) The melting points of 2 substances A & B are 280 K and 320 K respectively. Are these substances

liquid at room temperature? Justify your answer.

(b) Give an example that shows the state of matter can be changed into another state by changing the temperature.

(a) _____
_____

(b) _____
_____

77. How will you show that matter is composed of tiny particles?

_____
_____
_____
_____
_____
_____

78. Define (i) Latent heat of fusion and (ii) latent heat of vapourisation.

(i) _____
_____
_____

(ii) _____
_____
_____

79. When a bottle of scent is opened in one corner of a room, it immediately spreads throughout the room. What property of matter is responsible for this observation? Explain.

_____
_____
_____
_____
_____
_____
_____
_____

80. (a) Conversion of solid to vapour is called sublimation. Name the term used to denote the conversion of vapour to solid.

(b) Conversion of solid state to liquid state is called fusion; what is meant by latent heat of fusion?

(a) _____
_____

(b) _____
_____

81. Both boiling and evaporation convert a liquid into vapours. What is the difference between the two processes?

_____
_____
_____

82. A sample of water under study was found to boil at 102°C at normal pressure. Is the water pure? Will this water freeze at 0°C? Comment.

83. Why does the temperature of a substance remain constant during its m.pt. or boiling point?

84. You want to wear your favourite shirt to a party but the problem is that it is still wet after a wash. What steps would you take to dry it fast?

85. Give reasons:
    (a) Steam produces more severe burns than boiling water.
    (b) We are able to sip hot tea faster from a saucer rather than from a cup.
    (c) Water kept in an earthen pot becomes cool during summer.

    (a)

(b) _____

(c) _____

(d) _____

86. What is condensation? How is the condensation of a gas carried out?

_____

87. Why do solids not diffuse?

_____

88. Convert the following Kelvin temperature to degrees Celsius.
    (a) 175 K   (b) 295 K   (c) 300 K   (d) 225 K

    (a) _____

    (b) _____

    (c) _____

    (d) _____

89. Convert the following Celsius temperature to Kelvin temperature.
    (a) 25 ^{0}C   (b) -15 ^{0}C   (c) 0 ^{0}C   (d) 3 ^{0}C

    (a) _____

    (b) _____

    (c) _____

    (d) _____

90. Arrange the following substances in increasing order of intermolecular force of attraction: water, sugar, oxygen

91. Why does the temperature of a substance remain constant during melting and boiling even when heat is being supplied to it continuously?

92. Give three examples of crystalline and amorphous solids.

93. Why is motor oil more viscous than water? Does motor oil have a greater surface tension than water.

Objective Questions

1.1 Which one of the following sets of phenomena would increase on raising the temperature?

   (a) Diffusion, evaporation, compression of gases

   (b) Evaporation, compression of gases, solubility

   (c) Evaporation, diffusion, expansion of gases

   (d) Evaporation, solubility, diffusion, compression of gases

1.2 Seema visited a Natural Gas Compressing Unit and found that the gas can be liquefied under specific conditions of temperature and pressure. While sharing her experience with friends she got confused. Help her to identify the correct set of conditions

   (a) Low temperature, low pressure

   (b) High temperature, low pressure

   (c) Low temperature, high pressure

   (d) High temperature, high pressure

1.3 The property to flow is unique to fluids. Which one of the following statements is correct?

   (a) Only gases behave like fluids

   (b) Gases and solids behave like fluids

   (c) Gases and liquids behave like fluids

   (d) Only liquids are fluids

1.4 During summer, water kept in an earthen pot becomes cool because of the phenomenon of

   (a) diffusion

   (b) transpiration

   (c) osmosis

   (d) evaporation

1.5 A few substances are arranged in the increasing order of 'forces of attraction' between their particles. Which one of the following represents a correct arrangement?

   (a) Water, air, wind

   (b) Air, sugar, oil

   (c) Oxygen, water, sugar

   (d) Salt, juice, air

1.6 On converting 25°C, 38°C and 66°C to kelvin scale, the correct sequence of temperature will be

   (a) 298 K, 311 K and 339 K

   (b) 298 K, 300 K and 338 K

   (c) 273 K, 278 K and 543 K

   (d) 298 K, 310 K and 338 K

1.7 Choose the correct statement of the following

   (a) conversion of solid into vapours without passing through the liquid state is called vapourisation.

   (b) conversion of vapours into solid without passing through the liquid state is called sublimation.

   (c) conversion of vapours into solid without passing through the liquid state is called freezing.

   (d) conversion of solid into liquid is called sublimation.

1.8 The boiling points of diethyl ether, acetone and n-butyl alcohol are 35°C, 56°C and 118°C respectively. Which one of the following correctly represents their boiling points in kelvin scale?

   (a) 306 K, 329 K, 391 K

   (b) 308 K, 329 K, 392 K

   (c) 308 K, 329 K, 391 K

   (d) 329 K, 392 K, 308 K

1.9 Which condition out of the following will increase the evaporation of water?

   (a) Increase in temperature of water

   (b) Decrease in temperature of water

   (c) Less exposed surface area of water

(d) Adding common salt to water

1.10 In which of the following conditions, the distance between the molecules of hydrogen gas would increase?

(i) Increasing pressure on hydrogen contained in a closed container

(ii) Some hydrogen gas leaking out of the container

(iii) Increasing the volume of the container of hydrogen gas

(iv) Adding more hydrogen gas to the container without increasing the volume of the container

(a) (i) and (iii)

(b) (i) and (iv)

(c) (ii) and (iii)

(d) (ii) and (iv)

CHAPTER 2

IS MATTER AROUND US PURE

FILL IN THE BLANKS:-

1. Common salt is _____.

2. A mixture contains more than _____ substance mixed in _____ proportion.

3. Properties of a _____ are different from its constituent elements, whereas a _____ shows the properties of its constituting elements.

4. A solution is defined as a mixture that is------------.

5. We can remove salts from a solution by using the process of ----------

6. A pure substance has a fixed_____ or _____ at constant temperature.

7. An element is made up of only one kind of _____.

8. Miscible liquids are separated by _____.

9. Immiscible liquids are separated by using a _____.

10. Filtered tea is a _____ mixture.

11. Alloy is a _____.

12. Sublimation of camphor is a _____ change.

13. Most common chemical change we observe in our routine life is rusting of_____.

14. TRUE / FALSE
    (a) Water is homogenous substance._____
    (b) Element is always metal._____
    (c) Substance is always homogeneous_____
    (d) In compound elements combine in definite proportion._____
    (e) Iodine can be purified by sublimation._____

15. State any one difference between pure and impure substances.

    ----

16. What is meant by concentration of a solution?

    ----

17. List the two conditions essential for using distillation as a method for separation of the components from a mixture.

18. Smoke and fog both are aerosols. In what way are they different?

19. What do you understand by the statement the solubility of NaCl is 36.5 g at room temperature'?

20. Salt can be recovered from its solution by evaporation. Can you suggest any other technique also?

21. Can we separate alcohol dissolved in water by using a separating funnel? If yes, then describe the procedure. Of not, explain.

22. Crystallization is a better technique than sample evaporation. Give one reason to justify the statement.

23. How Tyndall effect can be observed in the canopy of a dense forest.

24. How do solution and gel differ from each other? Give one example for each.

25. What are aerosols? Give any two examples.

26. What is meant by an aqueous and non-aqueous solutions? Give one example of each.

27. What is a solution? Write two examples.

28. When is a solution said to be saturated? How can you change an unsaturated solution to a saturated solution without adding any more solvent to it?

29. Smoke and fog are aerosols. How do they differ from each other?

30. What is Tyndall effect? Why the solution of copper sulphate does not show Tyndall effect?

31. Define element, compound and mixture.

32. What are pure substance? Give two examples of metals.

33. What are metals? Given two examples of metals.

34. Which method can be used to separate a mixture of naphthalene and common salt?

35. What difference in the property of two miscible liquids enables their separation by fractional distillation?

36. Why is solution not heated to dryness to get crystals?

37. Give one example each of homogeneous and heterogeneous mixture.

38. Name the apparatus by which mixture of oil and water can be separated.

39. How can we check whether the given solid substance is pure or not?

40. A hard substance produces a tinkling sound when beat. Is it metal or a non- metal?

41. A mixture consisting of two miscible liquids 'A' and 'B' whose boiling points differ by 5^0 C can be separated by which process?

42. Which separation, technique is employed to separate complex mixture of organic compounds like carbohydrates, amino acids. Vitamins, hormones, etc?

43. In fractional crystallization two organic compounds gets differentiated on the basis of which property.

44. Which method can be used to separate mixture of iron filings and common salt?

45. Give one example of solid- liquid homogeneous mixture.

46. What is a aquaregia?

47. A solution is prepared by adding 40 g of sugar in 100 g of water. Calculate the concentration in terms of mass by mass percentage of solution.

48. What volume of ethyl alcohol and water must be mixed together to prepare 250 ml of 60% by volume of alcohol in water.

49. Which method is used to separate two immiscible liquids?

50. Name two elements which are in liquid state at room temperature?

51. Sea water can be classified as homogeneous as well as heterogeneous mixture. Comment.

52. Explain why particles of a colloidal solution do not settle down when left undisturbed, while in the case of a suspension they do.

53. Non-metals are usually poor conductors of heat and electricity. They are non-lustrous, non-sonorous, non-malleable and are coloured.
    (a) Name a lustrous non-metal.
    (b) Name a non-metal which exists as a liquid at room temperature.
    (c) The allotropic form of a non – metal is a good conductor of electricity. Name the allotrope.
    (d) Name a non-metal which is known to form the largest number of compounds.
    (e) Name a non-metal other than carbon which shows allotrophy.
    (f) Name a non-metal which is required for combustion.

    (a) --

    (b) --

    (c) --

    (d) --

    (e) --

    (f) --
    ----

54. Define homogeneous and heterogeneous mixtures.

55. Classify the following into elements, compounds and mixtures.
    (a) Sodium   (b) Soil   (c) Sugar solution   (d) Silver

    (a) --

    (b) --

    (c) --

    (d) --

56. Classify each of the following as a homogeneous or heterogeneous mixture. Soda water, wood, air, soil, vinegar

57. Classify the following elements as metal, nonmetal, or metalloid: aluminum, fluorine, gallium, phosphorus, krypton, tellurium, thorium, barium and strontium.

58. Given the names of the elements present in the following compounds:
   (a) Quicklime
   (b) Hydrogen bromide
   (c) Baking soda
   (d) Potassium sulphate

   (a) _____
   (b) _____
   (c) _____
   (d) _____

59. You are provided with solution of substance 'X'. how will you test whether it is saturated or unsaturated with respect to 'X' at a given temperature? What happens when a hot saturated solution is allowed to cool?

60. Name the appropriate methods to separate the following:
   (a) Nitrogen from air

(b) Dye from blue ink
(c) Butter cream from milk
(d) Ammonium chloride from common salt

(a) _____

(b) _____

(c) _____

(d) _____

61. State the separation technique used for the separation of the following:
(a) Ammonium chloride from a mixture containing sodium chloride and ammonium chloride
(b) Copper sulphate from its solution in water.

(a) _____

(b) _____

62. Can an element be distinguished from its compound by examination of its physical properties only? Explain.

_____

63. Explain why, water is a compound and not a mixture?

_____

64. How do the properties of a mixture differ from the properties of the components of the mixture?

_____

65. In terms of physical properties, what is there about mixtures that makes it possible to separate out the components?

66. How would you separate the following mixture?
    (i) Salt and water
    (ii) Glass powder and iron filings

    (i)

    (ii)

67. What are metalloids? Give two examples.

68. Classify the following as metals, non-metals and metalloids:
    Copper, silicon, carbon, chlorine, gold, boron.

69. (a) Identify two non – metals from the following elements:

Carbon, Sodium, Chlorine, Neon, Platinum
(b) Name the appropriate method to separate nitrogen from air.
(c) Identify dispersed phase and dispersion medium in foam and rubber.

(a) ---

(b) ---

(c) ---

70. Which method is used to separate two immiscible liquids?

71. Name two elements which are in liquid state at room temperature?

72. List five characteristics by which compounds can be distinguished from mixtures.

73. What is chromatography? Explain by giving principle involved. State its important applications.

74. Identify the following as homogeneous or heterogeneous matter.
(a) Gasoline   (b) Dirt   (c) Smog   (d) Alcohol

(a) ---

(b) ---

(c) ---

(d) ---

75. Suggest a scheme for the separation of constituents of the following mixture:
Sulphur + sand + sugar + iron filings

----

76. Which method of distillation is employed for the concentration of raw juice in sugar factories
Explain in detail.

----

77. A solution contains 40 g of common salt in 320 g of water. Calculate the concentration in terms of mass by mass percentage of the solution.

----

78. Define solubility. How does solubility. How does solubility of a solid in water change with temperature?

----

79. Two students A and B were given 10 ml of water in a bowl and a plate respectively. They were told to observe the rate of evaporation. Name the student whose water evaporates faster and explain its reason.

80. Why the inter-conversion of states of matter is considered as a physical change? Give three reasons to justify your answer.

81. During an experiment the students were asked to prepare a 10 % (Mass/ Mass) solution of sugar in water. Ramesh dissolved 10 g of sugar in 100 g of water while Sarika prepared it by dissolving 10 g of sugar in water to make 100 g of the solution.
(a) Are the two solutions of the same concentration?
(b) Compare the mass % of the two solutions.

(a)

(b)---

82. Give an example for each of following:
(a) Solid -liquid homogeneous mixture
(b) Gas- gas homogeneous mixture
(c) Liquid -liquid heterogeneous misture

(a) ---

(b) ---

(c) ---

83. With the help of a flow diagram, show the process of obtaining different gases from air. if the boiling point of oxygen, argon and nitrogen are 183° C, - 186° C and - 196° C respectively, which gas gets liquefied first as the air is cooled?

84. Differentiate between miscible and immiscible liquids. Give an example of each.

85. Crystallization is better technique than simple evaporation technique. Justify this statement by giving two reasons.

86. When do we use the process of centrifugation? State the principle involved in this process. List its any two applications in our daily life.

87. A mixture contains two liquids A and B, which differ in tyheir boiling points by 20 K. suggest a suitable process to separate them. Draw a neat labeled diagram to explain this process.

88. Define distillation. What type of mixture can be separated by distillation?

Objective Questions

2.1 Which of the following statements are true for pure substances?

(i) Pure substances contain only one kind of particles

(ii) Pure substances may be compounds or mixtures

(iii) Pure substances have the same composition throughout

(iv) Pure substances can be exemplified by all elements other than nickel

   (a) (i) and (ii)

   (b) (i) and (iii)

   (c) (iii) and (iv)

   (d) (ii) and (iii)

2.2 Rusting of an article made up of iron is called

   (a) corrosion and it is a physical as well as chemical change

   (b) dissolution and it is a physical change

   (c) corrosion and it is a chemical change

   (d) dissolution and it is a chemical change

2.3 A mixture of sulphur and carbon disulphide is

   (a) heterogeneous and shows Tyndall effect

   (b) homogeneous and shows Tyndall effect

   (c) heterogeneous and does not show Tyndall effect

   (d) homogeneous and does not show Tyndall effect

2.4 Tincture of iodine has antiseptic properties. This solution is made by dissolving

   (a) iodine in potassium iodide

   (b) iodine in vaseline

   (c) iodine in water

   (d) iodine in alcohol

2.5 Which of the following are homogeneous in nature? (i) ice (ii) wood (iii) soil (iv) air

   (a) (i) and (iii)

   (b) (ii) and (iv)

   (c) (i) and (iv)

   (d) (iii) and (iv)

2.6 Which of the following are physical changes?

(i) Melting of iron metal

(ii) Rusting of iron

(iii) Bending of an iron rod

(iv) Drawing a wire of iron metal

   (a) (i), (ii) and (iii)

   (b) (i), (ii) and (iv)

   (c) (i), (iii) and (iv)

   (d) (ii), (iii) and (iv)

2.7 Which of the following are chemical changes?

(i) Decaying of wood

(ii) Burning of wood

(iii) Sawing of wood

(iv) Hammering of a nail into a piece of wood

   (a) (i) and (ii)

   (b) (ii) and (iii)

   (c) (iii) and (iv)

   (d) (i) and (iv)

2.8 Two substances, A and B were made to react to form a third substance, A_2B according to the following reaction $2A + B \rightarrow A_2B$ Which of the following statements concerning this reaction are incorrect?

(i) The product A2B shows the properties of substances A and B

(ii) The product will always have a fixed composition

(iii) The product so formed cannot be classified as a compound

(iv) The product so formed is an element

(a) (i), (ii) and (iii),

(b) (ii), (iii) and (iv)

(c) (i), (iii) and (iv)

(d) (ii), (iii) and (iv)

2.9 Two chemical species X and Y combine together to form a product P which contains both X and Y $X + Y \rightarrow P$ X and Y cannot be broken down into simpler substances by simple chemical reactions. Which of the following concerning the species X, Y and P are correct?

(i) P is a compound

(ii) X and Y are compounds

(iii) X and Y are elements

(iv) P has a fixed composition

(a) (i), (ii) and (iii),

(b) (i), (ii) and (iv)

(c) (ii), (iii) and (iv)

(d) (i), (iii) and (iv)

3 ATOMS AND MOLECULES

CHAPTER

1. Who established the two important laws of chemical combinations?

   ----

2. What are the laws of chemical combinations?

   ----

3. What is the law of conservation of mass?

   ----

4. Give an example to show Law of conservation of mass applies to physical change also.

   ----

5. Explain with example that law of conservation of mass is valid for chemical reactions.

   ----

6. The 2.8 g of nitrogen gas was allowed to react with 0.6 g of hydrogen gas to produce 3.4 g of ammonia. Show that these observations are in agreement with the law of Conservation of mass.

7. If 12 g of carbon is burnt in the presence of 32 g of oxygen, how much carbon dioxide will be formed?

8. Who proposed Law of Definite Proportions (or Law of Constant Composition)?

9. State Law of constant proportions. Explain with an example.

10. Show that water illustrates the law of constant proportions.

11. Hydrogen and oxygen combine in the ratio of 1:8 by mass to form water. What mass of oxygen gas would be required to react completely with 3 g of hydrogen gas?

12. A 0.24 g sample of compound of oxygen and boron was found by analysis to contain 0.096 g of boron and 0.144 g of oxygen. Calculate the percentage composition of the compound by weight.

13. When 3.0 g of carbon is burnt in 8.00 g xygen, 11.00 g of carbon dioxide is produced. What mass of carbon dioxide will be formed when 3.00 g of carbon is burnt in 50.00 g of oxygen? Which law of chemical combination will govern your answer?

14. Magnesium and oxygen combine in the ratio of 3 : 2 by mass to form magnesium oxide. How much oxygen is req ired to react completely with 12 g of magnesium?

15. What are the postulates of Dalton's atomic theory?

16. Which of the following statements is NOT true about an atom?
    (a) Atoms are the building blocks from which molecules and ions are formed.
    (b) Atoms cannot exist independently.

(c) Atoms are neutral in nature

(d) Atoms combine together to form matter that we can see, feel or touch.

(a) _____

(b) _____

(c) _____

(d) _____

17. What is an atom?

_____

18. Why is it not possible to see an atom with naked eyes?

_____

19. Who proposed the chemical notation based on first two letters of the name of the element?

_____

20. Name the international organization who approves names of elements.

_____

21. What is the chemical symbol for iron?

_____

22. Name five elements have single letter chemical symbol.

_____

23. Name the element having following Latin names

(a) Stibium   (b) Cuprum   (c) Argentum   (d) Natrium

(a) _____

(b) _____

(c) _____

(d) _____

24. Write the chemical symbols of the following:
(a) Gold   (b) Iron   (c) Chlorine   (d) Mercury

(a) --

(b) --

(c) --

(d) --

25. How will you define chemical symbol?

26. What is the significance of a chemical symbol?

27. Can atoms of an element exist independently? Give examples of elements which exist in atomic form. Give examples of elements that do not exist in atomic form.

28. Why do atoms of the most of the elements not exist independently?

29. Which element has the smallest atom in size?

30. What is the atomic mass unit?

31. Magnesium is two times heavier than C-12 at m, what shall be the mass of Mg atom in terms of atomic mass units? (Given m ss of C-12 atom = 12u)

32. What is relative atomic mass of n element? How it is related to atomic mass unit?

33. Define molecule. What are its important properties?

34. Based on type of substance, how molecules are classified?

35. What is atomicity?

36. Based on atomicity, how molecules are categorized?

37. Give three examples of monoatomic molecules.

38. Give four examples of diatomic molecules.

39. What is an ion?

40. What are polyatomic ions? Give examples?

41. Give examples of triatomic molecules.

42. What is valency of an element?

43. What is meant by the term chemical formula?

44. Write down the formulae of
    (i) sodium oxide
    (ii) aluminium chloride
    (iii) sodium suphide
    (iv) magnesium hydroxide

    (i)

    (ii)

    (iii)

    (iv)

45. Write down the names of compounds represented by the following formulae:
    (i) $Al_2(SO_4)_3$ (ii) $CaCl_2$ (iii) K_2SO_4 (iv) KNO_3

    (i) --

    (ii) --

    (iii) --

    (iv) --
    ----

46. Write the chemical formulae of the following. Also identify the ions present.
    (a) Magnesium chloride
    (b) Calcium oxide
    (c) Copper nitrate
    (d) Aluminium chloride

    (a) --

    (b) --

    (c) --

    (d) --
    ----

47. Give the names of the elements present in the following compounds.
    (a) Quick lime
    (b) Hydrogen bromide
    (c) Baking powder
    (d) Potassium sulphate.

    (a) --

    (b) --

    (c) --

    (d) --
    ----

48. How many atoms are present in
    (i) H_2S molecule and
    (ii) PO_4^{3-} ion?

    (a) --

    (b) --
    ----

49. (a) Write a chemical formula of compound using zinc ion and phosphate ion.

(b) Calculate the ratio by mass of atoms present in a molecule of carbon dioxide. (Given C =12, O =16)

(a) ---

(b) ---

----

50. What is Formula Unit Mass? How it is different from molecular mass?

----

51. Calculate the formula unit masses of ZnO, Na_2O, K_2CO_3, given atomic masses of Zn = 65 u, Na = 23 u, K = 39 u, C = 12 u, and O = 16 u.

----

52. What are ionic compounds?

----

53. How do we know the presence of atoms if they do not exist independently for most of the elements?

----

54. An element 'Z' forms the following compound when it reacts with hydrogen, chlorine, oxygen and phosphorus. ZH_3, ZCl_3, Z_2O_3 and ZP
(a) What is the valency of element Z?
(b) Element 'Z' is metal or non-metal?

(a) ---

(b) ---

----

55. Name one element each which forms diatomic and tetra atomic molecule.

----

56. Name one element which forms diatomic and triatomic molecule.

57. What is gram-atomic mass of an element?

58. What is gram-molecular mass of a substance?

59. Define mole. What is its significance?

60. What is molar mass?

61. Who introduced the term 'mole' in chemistry?

62. When 'mole' was chosen internationally standard way to express larger number of chemical units?

63. How many moles are there in 4.6 gms of Sodium(Na)?

64. If one mole of carbon atoms weights 12 gram, what is the mass (in gram) of 1 atom of carbon?

65. Which has more number of atoms, 100 grams of sodium or 100 grams of iron (given, atomic mass of Na = 23 u, Fe = 56 u)?

-----

66. What is the mass of
    (a) 1 mole of nitrogen atoms?
    (b) 4 moles of aluminium atoms (Atomic mass of aluminium = 27)?
    (c) 10 moles of sodium sulphite (Na_2SO_3)?

    (a) --

    (b) --

    (c) --
    ----

67. Convert into moles:
    (a) 12 g of oxygen gas
    (b) 20 g of water
    (c) 22 g of carbon dioxide

    (a) --

    (b) --

    (c) --
    ----

68. What is the mass of: (a) 0.2 mole of oxygen atoms? (b) 0.5 mole of water molecules?

    (a)--

    (b) --
    ----

69. Find out number of atoms in 15 moles of He.

    ----

70. Calculate the number of molecules of sulphur (S_8) present in 16 g of solid sulphur.

    ----

71. Calculate the number of al mini m ions present in 0.051 g of aluminium oxide. (Hint: The mass of an ion is the same as that of an atom of the same element. Atomic mass of Al = 27 u)

    ----

72. Calculate the mass percentage of Carbon(C) , Hydrogen (H) and Oxygen (O) in one molecule of glucouse ($C_6H_{12}O_6$). (Atomic mass of C = 12u, H = 1u and O = 16u)

73. Calculate the number of molecules of phosphorus (P_4) present in 31 gram of phosphorus.

74. Find the ratio by mass of the combining elements in the compound – C_2H_5OH.

75. Give the formula of the compound formed by the elements calcium and fluorine.

76. What is the acid radical present in sodium peroxide?

77. Carbon and silicon have the same valency. What is the formula of sodium silicate?

78. What is the ratio by number of atoms in mercurous chloride?

79. Name the element whose Latin name is Stibium.

80. What is the valency of a sulphide ion?

81. How many atoms of oxygen are present in 50g of $CaCO_3$?

82. How many molecules are present in 1 ml of water?

83. What is the unit of measurement of atomic radius?

84. Name the international organization who approves names of elements.

85. How do we know the presence of atoms if they do not exist independently for most of the elements?

86. Give an example to show Law of conservation of mass applies to physical change also.

87. Explain with example that law of conservation of mass is valid for chemical reactions.

88. Is there any exception to law of conservation of mass?

89. In a reaction, 5.3 g of sodium carbonate reacted with 6 g of ethanoic acid. The products were 2.2 g of carbon dioxide, 0.9 g water and 8.2 g of sodium ethanoate. Show that these observations are in agreement with the law of conservation of mass. sodium carbonate + ethanoic acid → sodium ethanoate + carbon dioxide + water

90. If 12 g of carbon is burnt in the presence of 32 g of oxygen, how much carbon dioxide will be formed?

91. A 0.24 g sample of compound of oxygen and boron was found by analysis to contain 0.096 g of boron and 0.144 g of oxygen. Calculate the percentage composition of the compound by weight.

92. When 3.0 g of carbon is burnt in 8.00 g oxygen, 11.00 g of carbon dioxide is produced. What mass of carbon dioxide will be formed when 3.00 g of carbon is burnt in 50.00 g of oxygen? Which law of chemical combination will govern your answer?

93. Magnesium and oxygen combine in the ratio of 3 : 2 by mass to form magnesium oxide. How much oxygen is required to react completely with 12 g of magnesium?

94. Why are Dalton's symbol not used in chemistry?

95. What is the fraction of the mass of water due to neutrons?

Objective Questions

3.01 Which of the following correctly represents 360 g of water?

(i) 2 moles of H_2O

(ii) 20 moles of water

(iii) 6.022×10^{23} molecules of water

(iv) 1.2044×10^{25} molecules of water

  (a) (i)

  (b) (i) and (iv)

  (c) (ii) and (iii)

  (d) (ii) and (iv)

3.2 Which of the following statements is not true about an atom?

  (a) Atoms are not able to exist independently

  (b) Atoms are the basic units from which molecules and ions are formed

  (c) Atoms are always neutral in nature

  (d) Atoms aggregate in large numbers to form the matter that we can see, feel or touch

3.3 The chemical symbol for nitrogen gas is

  (a) Ni

  (b) N_2

  (c) N^+

  (d) N

3.4 The chemical symbol for sodium is

  (a) So

  (b) Sd

  (c) NA

  (d) Na

3.5 Which of the following would weigh the highest?

  (a) 0.2 mole of sucrose ($C_{12}H_{22}O_{11}$)

  (b) 2 moles of CO_2

  (c) 2 moles of $CaCO_3$

  (d) 10 moles of H_2O

3.6 Which of the following has maximum number of atoms?

  (a) 18g of H_2O

  (b) 18g of O_2

  (c) 18g of CO_2

  (d) 18g of CH_4

3.7 Which of the following contains maximum number of molecules?

  (a) 1g CO_2

  (b) 1g N_2

  (c) 1g H_2

  (d) 1g CH_4

3.8 Mass of one atom of oxygen is

  (a) $\frac{16}{6.023 \times 10^{23}} g$

  (b) $\frac{32}{6.023 \times 10^{23}} g$

  (c) $\frac{1}{6.023 \times 10^{23}} g$

  (d) 8u

3.9 3.42 g of sucrose are dissolved in 18g of water in a beaker. The number of oxygen atoms in the solution are

  (a) 6.68×10^{23}

  (b) 6.09×1022

  (c) 6.022×10^{23}

  (d) 6.022×10^{21}

3.10 A change in the physical state can be brought about

  (a) only when energy is given to the system

  (b) only when energy is taken out from the system

  (c) when energy is either given to, or taken out from the system

  (d) without any energy change

CHAPTER 4 — STRUCTURE OF THE ATOM

Fill in the blanks:

1. According to Maharishi Kanad, the tiniest to tiny particle of a pure substance is called _____.

2. An atom is the smallest unit of an element which takes part in a _____.

3. Mass of an electron is 1/1837 times less than the mass of one atom of _____.

4. The K-shell of any atom cannot have more than _____ electrons.

5. Isotopes are the atoms of _____ element, having same atomic number but different mass number.

6. An atom of an element has 11 protons 11 electrons and 12 neutrons. The atomic mass of the atom is _____.

7. Almost all the mass of an atom is concentrated in a small region of space called the _____.

8. The subatomic particle not present in a hydrogen atom is _____.

9. Cathode ray are a beam of fast moving _____.

10. _____ and _____ more or less complexly make up the mass of an atom.

11. The number of neutrons in the neutrons in the neutrons of an atom can be calculated by _____ the atomic number of _____ its mass number.

12. The isotopes of an element do not differ in the number of _____ but do differ in the number of _____.

13. The type of radiations, which are not deflected in presence of electric or magnetic field are termed as rays.

14. The penetrating power of B-rays is _____ times more than a-rays.

15. Synthetic elements are those which are prepared by _____.

16. The control rods in a nuclear reactor are made up of _____.

17. _____ are stored in deep mines which are not in use.

18. When an elements emits B-particle, its mass number _____.

19. Y-rays are _____ radiations.

20. The difference between the actual isotopic mass and the sum of masses of protons, neutrons and electrons is called _____.

21. _____ are the best dombarding particles.

22. _____ is used for the treatment of leukaemia.

23. True / False:
    (a) Radioactive isotope of iodine is used for making the medicine called tincture iodne._____
    (b) Thomson proposed that the nucleus of an atom contains protons and neutrons._____
    (c) J.J. Thomson proposed that the nucleus of an atom contains only nucleons._____
    (d) An electron has a mass that is much less than a proton._____
    (e) There is no particle of matter smaller than an atom._____
    (f) Atoms of an element may have more or less neutrons or electrons than other atoms of the same element._____
    (g) The innermost atomic shell can hold a maximum of 18 electons._____
    (h) B- Particles are fast moving electrons carrying negative charge._____

24. Write the charge and mass of an electron?

    ----

25. How many electrons at the maximum can be present in the first shell of an atom?

    ----

26. List three subatomic particles of an atom?

    ----

27. Name two any two noble gases?

    ----

28. Write the value of charge on electron.

    ----

29. Define mass number?

    ----

30. Define atomic number?

    ----

31. Why did Rutherford select a gold foil for his experiment?

    ----

32. What are canal rays?

_____

_____

_____

_____

33. Write the symbols of two isotopes of uranium?

_____

_____

34. Helium atom has two electrons in its valence shell but its valency is not two. Explain?

_____

_____

_____

_____

_____

_____

_____

_____

35. Draw a diagram of the Thomson's model of an atom. Why was it discarded?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

36. What are the differences between isotopes and isobars?

_____

_____

_____

_____

_____

_____

37. Compare all proposed models of an atom?

_____

_____

_____

_____

_____

_____

38. An ion M^{+3} has 10 electrons and 14 neutrons. Find its atomic number and mass number of M?

39. Magnesium has 12 protons and 12 neutrons. Fid the valency of magnesium?

40. Write the conclusions drawn by Rutherford for the following observing during his alpha scattering experiment:
    (a) Most of the alpha- particle passed straight through the gold foil.
    (b) Some alpha- particles getting deflected from their path.
    (c) Very small fraction of alpha- particles getting deflected by 180C.

    (a)

    (b)

    (c)

41. An element is represented as $_8X^{16}$ Find:

(a) The number of electrons in element X.
(b) Mass number of an element X.
(c) The number of neutrons in element X.

(a) --

(b) --

(c) --
----

42. With the help of labeled diagram describe in brief the Rutherford's experiment. Write any three important conclusions drawn from the experiment?

----

43. List three differences between electron, proton and neutron?

----

44. Compare the K and K+ ion on the following parameters:
(a) Number of electrons
(b) Electronic configuration
(c) Atomic structure (energy shells)

(a) --

(b) --

(c) --
----

45. Give reasons of following:
    a) An atom is electrically neutral.
    b) Ions are more stable than atoms.
    c) Noble gases show low reactivity.

    (a) _____
    _____
    _____
    _____

    (b) _____
    _____
    _____
    _____

    (c) _____
    _____
    _____
    _____

46. Name two elements which have isotopes. Write the symbol of their isotopes and provide an account of the sub-atomic particles present in each of these isotopes.

    _____
    _____
    _____
    _____
    _____
    _____
    _____
    _____
    _____
    _____
    _____

47. Calculate the number of electrons, protons and neutrons in an atom of an element with atomic number 20 and mass number 40. Write electronic configuration and draw the structure of the atom?

    _____
    _____
    _____
    _____
    _____
    _____
    _____
    _____
    _____

48. An atom has complete K and L shells. Is this an atom of a metal, non-metal or noble gas? Justify?

    _____
    _____
    _____

49. Define the term valency? How is it different from valence electrons? Find the valency of oxygen and fluorine?

50. Write electronic configuration of the following elements and predict their valencies:
   (a) Fluorine: 9
   (b) Aluminium: 13
   (c) Argon: 18

   (a) --

   (b) --

   (c) --

51. What will be the composition of nucleus of the atom of an element with atomic number 19 and mass number 39? Also write its electronic configuration?

52. 'X' of atomic number 18 or element Z of atomic number 16? And why?

53. An element has electronic configuration of 2,8,7:
    (a) What is the atomic number of the element?
    (b) What is the name of the elements?
    (c) Which of the following elements have same number of valence electron? N(7), F(9), P(15) and Ar(18).

    (a) _____

    (b) _____

    (c) _____

54. State reasons for the following statements:
    a) Some elements possess fractional atomic mass.
    b) Isotopes of an element have similar chemical properties.
    c) Noble gases are inert.

    (a) _____

    (b) _____

    (c) _____

55. There are two elements A1326 and B1426. Find the number of sub-atomic particles in each of these elements. What is the relationship between the two?

56. Name the scientist who discovered proton. What is the approximate ratio of diameters of atom to that of its nucleus?

57. What are nucleus?

58. What are isotopes?

59. Neutrons can be found I all atomic nuclei except in one case. Name this atomic nucleus.

60. What did Rutherford's alpha- particle scattering experiment prove?

61. An atom contains five protons and six neutrons. What is ts atomic number and mass number?

62. If the number of electrons in an atom 8 and number of protons are also 8. Their atomic number of atom will be eight or zero?

63. Write the symbol of a element 'X' having atomic number 'Z' and mass number 'A'.

64. For which element is the atomic mass is same as that of a proton?

65. Who discovered the neutral particles present in an atom?

66. What conclusion would you derive from the observation, that in Rutherford's scattering experiment, most of the alpha- particles passed through gold foil without any deflection?

67. Which shell is closest to the nucleus of an atom?

68. Which energy level would accommodate the 17th electron?

69. Select the isotopes from the following?
21/10A; 22/10B; 23/11C; 23/12D

70. Who discovered the phenomenon of radioactivity?

71. Which radiations emitted by the radioactive substance have little effect on photographic plate or ZnS screen?

72. In the neutron induced fission reaction of 235/92U, one of the products is 95/36Kr. In this mode another nuclide and three neutrons are also produced.Identify the other nuclide.

73. What disadvantages do protons and a- particles have as nuclear projectiles?

74. What advantages do protons have over a- particles as nuclear projectiles?

75. What kind of elementary particles are used in artificial transmutation of elements?

76. Which isotope of uranium is used in nuclear reactor?

77. How is atomic mass related to the number of protons and number of neutrons?

78. What are valence electrons?

79. What happens when cathode rays strike the glass walls of the cathode ray tube?

Objective Questions

4.01 Which of the following correctly represent the electronic distribution in the Mg atom?

   (a) 3, 8, 1
   (b) 2, 8, 2
   (c) 1, 8, 3
   (d) 8, 2, 2

4.02 Rutherford's 'alpha (α) particles scattering experiment' resulted in to discovery of

   (a) Electron
   (b) Proton
   (c) Nucleus in the atom
   (d) Atomic mass

4.03 The number of electrons in an element X is 15 and the number of neutrons is 16. Which of the following is the correct representation of the element?

   (a) $^{31}_{15}X$
   (b) $^{31}_{16}X$
   (c) $^{16}_{15}X$
   (d) $^{15}_{16}X$

4.04 Dalton's atomic theory successfully explained (i) Law of conservation of mass (ii) Law of constant composition (iii) Law of radioactivity (iv) Law of multiple proportion

   (a) (i), (ii) and (iii)
   (b) (i), (iii) and (iv)
   (c) (ii), (iii) and (iv)
   (d) (i), (ii) and (iv)

4.05 Which of the following statements about Rutherford's model of atom are correct?

   (i) considered the nucleus as positively charged

   (ii) established that the α–particles are four times as heavy as a hydrogen atom

   (iii) can be compared to solar system

   (iv) was in agreement with Thomson's model

   (a) (i) and (iii)
   (b) (ii) and (iii)
   (c) (i) and (iv)
   (d) only (i)

4.06 Which of the following are true for an element? (i) Atomic number = number of protons + number of electrons (ii) Mass number = number of protons + number of neutrons (iii) Atomic mass = number of protons = number of neutrons (iv) Atomic number = number of protons = number of electrons

   (a) (i) and (ii)
   (b) (i) and (iii)
   (c) (ii) and (iii)
   (d) (ii) and (iv)

4.07 In the Thomson's model of atom, which of the following statments are correct?

   (i) the mass of the atom is assumed to be uniformaly distributed over the atom

   (ii) the positive charge is assumed to be uniformaly distributed over the atom

   (iii) the electrons are uniformaly distributed in the positively charged sphere

   (iv) the electrons attract each other to stabilise the atom

   (a) (i), (ii) and (iii)
   (b) (i) and (iii)
   (c) (i) and (iv)
   (d) (i), (iii) and (iv)

4.08 Rutherford's α–particle scattering experiment showed that

   (i) electrons have negative charge

   (ii) the mass and positive charge of the atom is concentrated in the nucleus

   (iii) neutron exists in the nucleus

   (iv) most of the space in atom is empty Which of the above statements are correct?

(a) (i) and (iii)

(b) (ii) and (iv)

(c) (i) and (iv)

(d) (iii) and (iv)

4.09 The ion of an element has 3 positive charges. Mass number of the atom is 27 and the number of neutrons is 14. What is the number of electrons in the ion?

(a) 13

(b) 10

(c) 14

(d) 16

4.10 Identify the Mg^{2+} ion from the Fig.4.1 where, n and p represent the number of neutrons and protons respectively
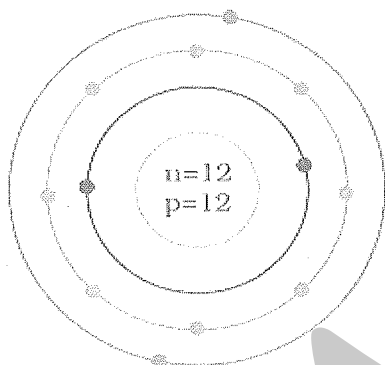
(a)
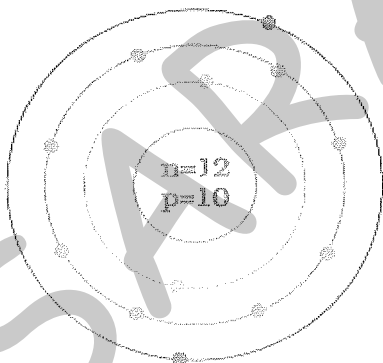
(b)
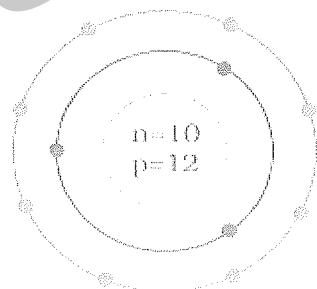
(c)
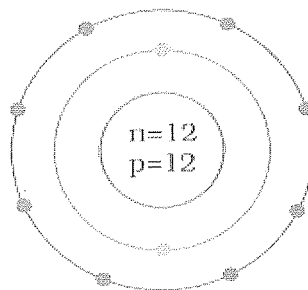
(d)

4.11 In a sample of ethyl ethanoate ($CH_3COOC_2H_5$) the two oxygen atoms have the same number of electrons but different number of neutrons. Which of the following is the correct reason for it?

(a) One of the oxygen atoms has gained electrons

(b) One of the oxygen atoms has gained two neutrons

(c) The two oxygen atoms are isotopes

(d) The two oxygen atoms are isobars.

4.12 Elements with valency 1 are

(a) always metals

(b) always metalloids

(c) either metals or non-metals

(d) always non-metals

4.13 The first model of an atom was given by

(a) N. Bohr

(b) E. Goldstein

(c) Rutherford

(d) J.J. Thomson

4.14 An atom with 3 protons and 4 neutrons will have a valency of

(a) 3

(b) 7

(c) 1

(d) 4

4.15 The electron distribution in an aluminium atom is

(a) 2, 8, 3

(b) 2, 8, 2

(c) 8, 2, 3

(d) 2, 3, 8

4.16 Which of the following in Fig. 4.2 do not represent Bohr's model of an atom correctly?

(i)   (ii)   (iii)   (iv)
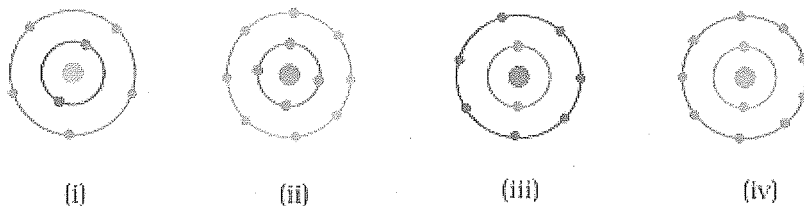
(a) (i) and (ii)

(b) (ii) and (iii)

(c) (ii) and (iv)

(d) (i) and (iv)

4.17 Which of the following statement is always correct?

(a) An atom has equal number of electrons and protons.

(b) An atom has equal number of electrons and neutrons.

(c) An atom has equal number of protons and neutrons.

(d) An atom has equal number of electrons, protons and neutrons.

4.18 Atomic models have been improved over the years. Arrange the following atomic models in the order of their chronological order

(i) Rutherford's atomic model

(ii) Thomson's atomic model

(iii) Bohr's atomic model

(a) (i), (ii) and (iii)

(b) (ii), (iii) and (i)

(c) (ii), (i) and (iii)

(d) (iii), (ii) and (i)

CHAPTER 5

THE FUNDAMENTAL UNIT OF LIFE

Fill in the blanks:

1.   Transporting channel of the cell is………………

2.   Chromosomes are made up of …………….. and……..

3.   The infolding of mitochondria is known as ……………

4.   Storage sac of the cell is…………………..

5.   Non-membranous organelle of cell is……………

6.   Smallest cell in human is………………..

7.   ……………………is the full form of DNA.

8.   ATP stands for…………………..

9.   Cells which change their shapes are……………. and………………

10. Largest cell in the world is…………………

11. Differentiate between:
     (a) Osmosis and diffusion
     (b) Prokaryotic cell and eukaryotic cell
     (c) plasma membrane and cell wall
     (d) plant cell and animal cell

     (a)--

     (b)--

(c)--

(d)--

----

12.   Give the structure and functions of following:
   (a) Endoplasmic reticulum
   (b) Mitochondria
   (c) Centrosome
   (d) Golgi bodies

(a)--

(b)--

(c)--

(d)

13. How do substance like CO_2 and water move in and out of the cell?

14. What is nucleus? Describe it parts and functions?

15. What happen?
(a) If Dry apricot placed in pure water?
(b) Plasma membrane get ruptures or breakdown?

(a)

(b)

16. Why lysosomes are called suicidal bag of the cell?

----

17. Name the Reticulum which has ribosome's attached to it .

----

18. Name a cell that does not have a nucleus, what are they called?

----

19. What is Biogenisis?

----

20. Who discovered Golgi Apparatus?
    (a) Camillo Golgi.
    (b) Robert Hooke
    (c) A.V. Leeuwenhoek
    (d) None of the above

----

21. Name the cell organelle which is involved in the formation of lysosomes.

----

22. What is the shape of Nucleus?

----

23. What is Endosmosis?

_____
_____
_____

24. Who discovered Protoplasm?

_____
_____

25. The word cell was derived from a Greek word ---------- which means small room

26. Name the person who first coined the term "Cell"

_____
_____

27. What will happen to a cell if its nucleus is removed?

_____
_____
_____
_____
_____

28. Give 5 examples of single celled organisms.

_____
_____
_____
_____
_____

29. What are multicellular organisms ? Give an example.

_____
_____
_____
_____
_____

30. The cell organelle which is commonly referred as the suicidal bags of the cell.

_____
_____
_____
_____

31. What is the Study of structure and composition of cell is called ?

_____
_____

32. What are the chromosomes made up of?

_____
_____
_____

33. Which of the following cellular part possess a double membrane?
    (a) Nucleus
    (b) Chloroplast
    (c) Mitochondrion
    (d) All of the above

34. Karyotheca is another name of –

    (a) Nuclear envelope
    (b) Nucleus
    (c) Nuclear pores
    (d) Nucleolus

35. Intercellular connections of plant cells are called -
    (a) Middle lamella
    (b) Micro fibrils
    (c) Matrix
    (d) Plasmodesmata

36. What is hypotonic solution?

37. What is hypertonic solution?

38. What is isotonic solution?

39. What is active transport?

40. Where are proteins synthesized inside the cell?

41. What is endocytosis?

42. Define plasmolysis.

43. Why is endocytosis found in animals only?

44. How does an Amoeba obtain its food?

45. What is membrane biogenesis? How is plasma membrane formed during this process?

46.   What are semiautonomous organelles? Describe with example?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

47.   Write the functions of following:
        (a) Aerolar tissue   (b) Lymph   (c) Golgi bodies   (d) Nucleus

        (a)_____
        _____
        _____
        _____
        _____
        _____

        (b)_____
        _____
        _____
        _____
        _____
        _____

        (c)_____
        _____
        _____
        _____
        _____
        _____
        _____
        _____

        (d)_____
        _____
        _____
        _____
        _____

48. Describe:
    (a) Membrane biogenesis and its significance
    (b) Plasmolysis
    (c) Plastid
    (d) centrosome

    (a) _____
    _____
    _____
    _____
    _____
    _____
    _____

    (b) _____
    _____
    _____
    _____
    _____
    _____

    (c) _____
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    _____
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    _____
    _____
    _____

    (d) _____
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    _____

49. Why plasma membrane is called selectively permeable?

    _____
    _____
    _____

50. Where are protein synthesized in the cell? How are they transported?

51. What happen:
    (a) If there were no ysosonm in the cell.
    (b) A red blood cell kept in concentrated salt solution.

    (a)

    (b)

52. What is the function of sieve tube cells and how they are designed to carry out their function?

53. How are cork formed?

54. Differentiate between different types of epithelium tissue in animal?

55. The first person to observe a cell under microscope was

    (a) M. Schleiden   (b) T. Schwann (c) Robert Hook   (d) A.V.Leeuwenhoek

56. Cell theory was propounded by
    (a) Morgan
    (b) Halden
    (c) Schleiden and Schwann
    (d) Robert Hooke

57. The word cell was coined by
    (a)Robert hooke   (b) Weismann   (c) Cuvier   (d) Darwin

58. Nucleus discovered by
    (a) Robert Hooke
    (b) Robert Brown
    (c) Dujardin
    (d) Purkinje

59. Smallest cells so far known are
    (a) Bacteria   (b) blue green algae
    (c) PPLOs   (d) human egg

60. Which of the following is the longest cell of animal kingdom?
    (a) Bacteria   (b) Nerve cell
    (c) Virus   (d) Muscle cell

61. Name the largest cell of living world.

62. Amoeba is a .... organism.

63. Who wrote the book"Micrographia"?

64. What is the composition of protoplasm?

----

65. Define cell.

----

66. Who gave the cell theory? What does it state? Which organism is an exception of cell theory?

----

67. Plasma membrane is made up of
    (a) Proteins and carbohydrates1   (b) Proteins and lipids
    (c) Proteins and nucleic acids   (d) Proteins, some nucleic acids and lipids

----
----

68. Plant cell wall is mainly composed of
    (a) Sugars   (b) Cellulose
    (c) Proteins   (d) lipids

----

69. Nucleus was discovered of
    (a) Robert Brown   (b) Robert Hooke
    (c) A.V. Leeuwenhoek   (d) Schwann

----

70. A solution is said to be hypotonic when
    (a) Concentration of medium is higher than that of the cell
    (b) Concentration of medium is equal to that of the cell
    (c) Concentration of medium is lower than that of the cell
    (d) None of the above are correct.

----

71. Cell wall shows
    (a) Complete permeability   (b) semipermeability
    (c) Differential permeability   (d) impermeability

72. Plasma membrane is –
    (a) Impermeable   (b) formed of cellulose
    (c) selectively permeable   (d) nonselective

73. Who gave the fluid mosaic model of plasma membrane ?

74. Movement of solvent into the cell is called as...............................

75. Which cell organelle is called as the head quarter of cell?

76. What is the difference between diffusion and osmosis?

77. Why plasma membrane is called as selectively permeable membrane ?

78. Draw a neat and labeled diagram of nucleus. State its main function.

79. Which cell organelle is called as 'power house of cell'?

----

80. Which cell organelle contains enzymes for ATP production?

----

81. **In mitochondria which portion contains specific proteins?**

----

82. Define Cristae.

----

83. State any two function of Golgi body.

----

84. Describe the types of endoplasmic reticulum and draw necessary figure. Give it's main functions also.

----

85. Draw a neat and labeled diagram of mitochondria.

----

86. Which cell organelle is called as "digestive bag" ?

_____

_____

87. Which organelle controls osmotic pressure in a cell ?

_____

_____

88. Plastids having Coloured pigments are called as ....

89. Name various type of plastids present in a plant cell.

_____

_____

_____

_____

_____

90. State the main function of lysosomes ?

_____

_____

_____

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_____

91. Differentiate between plant and animal cell with suitable figures.

_____

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Objective Questions

5.01 Which of the following can be made into crystal?

(a) A Bacterium

(b) An Amoeba

(c) A Virus

(d) A Sperm

5.02 A cell will swell up if

(a) The concentration of water molecules in the cell is higher than the concentration of water molecules in surrounding medium

(b) The concentration of water molecules in surrounding medium is higher than water molecules concentration in the cell

(c) The concentration of water molecules is same in the cell and in the surrounding medium

(d) Concentration of water molecules does not matter

5.03 Chromosomes are made up of

(a) DNA

(b) protein

(c) DNA and protein

(d) RNA

5.04 Which of these options are not a function of Ribosomes?

(i) It helps in manufacture of protein molecules

(ii) It helps in manufacture of enzymes

(iii) It helps in manufacture of hormones

(iv) It helps in manufacture of starch molecules

(a) (i) and (ii)

(b) (ii) and (iii)

(c) (iii) and (iv)

(d) (iv) and (i)

5.05 Which of these is not related to endoplasmic reticulum?

(a) It behaves as transport channel for proteins between nucleus and cytoplasm

(b) It transports materials between various regions in cytoplasm

(c) It can be the site of energy generation

(d) It can be the site for some biochemical activities of the cell

5.06 Following are a few definitions of osmosis Read carefully and select the correct definition

(a) Movement of water molecules from a region of higher concentration to a region of lower concentration through a semipermeable membrane

(b) Movement of solvent molecules from its higher concentration to lower concentration

(c) Movement of solvent molecules from higher concentration to lower concentration of solution through a permeable membrane

(d) Movement of solute molecules from lower concentration to higher concentration of solution through a semipermeable membrane

5.07 Plasmolysis in a plant cell is defined as

(a) break down (lysis) of plasma membrane in hypotonic medium

(b) shrinkage of cytoplasm in hypertonic medium

(c) shrinkage of nucleoplasm

(d) none of them

5.08 Which of the following are covered by a single membrane?

(a) Mitochondria

(b) Vacuole

(c) Lysosome

(d) Plastid

5.09 Find out the false sentences

(a) Golgi apparatus is involved with the formation of lysosomes

(b) Nucleus, mitochondria and plastid have DNA; hence they are able to make their own structural proteins

(c) Mitochondria is said to be the power house of the cell as ATP is generated in them.

(d) Cytoplasm is called as protoplasm

5.10 Find out the correct sentence

(a) Enzymes packed in Lysosomes are made through RER (rough endoplasmic reticulum)

(b) Rough endoplasmic reticulum and smooth endoplasmic reticulum produce lipid and protein respectively

(c) Endoplasmic reticulum is related with the destruction of plasma membrane

(d) Nucleoid is present inside the nucleoplasm of eukaryotic nucleus

5.11 Which cell organelle plays a crucial role in detoxifying many poisons and drugs in a cell?

(a) Golgi apparatus

(b) Lysosomes

(c) Smooth endoplasmic reticulum

(d) Vacuoles

5.12 The proteins and lipids, essential for building the cell membrane, are manufactured by

(a) rough endoplasmic reticulum

(b) golgi apparatus

(c) plasma membrane

(d) mitochondria

5.13 The undefined nuclear region of prokaryotes are also known as

(a) nucleus

(b) nucleolus

(c) nucleic acid

(d) nucleoid

5.14 The cell organelle involved in forming complex sugars from simple sugars are

(a) endoplasmic reticulum

(b) ribosomes

(c) plastids

(d) golgi apparatus

5.15 Which out of the following is not a function of vacuole?

(a) Storage

(b) Providing turgidity and rigidity to the cell

(c) Waste excretion

(d) Locomotion

5.16 Amoeba acquires its food through a process, termed

(a) exocytosis

(b) endocytosis

(c) plasmolysis

(d) exocytosis and endocytosis both

5.17 Cell wall of which one of these is not made up of cellulose?

(a) Bacteria

(b) Hydrilla

(c) Mango tree

(d) Cactus

5.18 Silver nitrate solution is used to study

(a) endoplasmic reticulum

(b) golgi apparatus

(c) nucleus

(d) mitochondria

5.19 Organelle other than nucleus, containing DNA is

(a) endoplasmic reticulum

(b) golgi apparatus

(c) mitochondria

(d) lysosome

5.20 Kitchen of the cell is

(a) mitochondria

(b) endoplasmic reticulum

(c) chloroplast

(d) golgi apparatus

5.21 Lipid molecules in the cell are sythesized by

(a) smooth endoplasmic reticulum

(b) rough endoplasmic reticulum

(c) golgi apparatus

(d) plastids

5.22 Cell arises from pre-existing cell was stated by

(a) Haeckel

(b) Virchow

(c) Hooke

(d) Schleiden

5.23 Cell theory was given by

(a) Schleiden and Schwann

(b) Virchow

(c) Hooke

(d) Haeckel

5.24 The only cell organelle seen in prokaryotic cell is

    (a) mitochondria

    (b) ribosomes

    (c) plastids

    (d) lysosomes

5.25 Organelle without a cell membrane is

    (a) ribosome

    (b) golgi apparatus

    (c) chloroplast

    (d) nucleus

5.26 1 μm is

    (a) 10^{-6}m

    (b) 10^{-9}m

    (c) 10^{-10}m

    (d) 10^{-3} m

5.27 Lysosome arises from

    (a) endoplasmic reticulum

    (b) golgi apparatus

    (c) nucleus

    (d) mitochondria

5.28 Living cells were discovered by

    (a) Robert Hooke

    (b) Purkinje

    (c) Leeuwenhoek

    (d) Robert Brown

5.29 Select the odd one out

    (a) The movement of water across a semi permeable membrane is affected by the amount of substances dissolved in it.

    (b) Membranes are made of organic molecules like proteins and lipids

    (c) Molecules soluble in organic solvents can easily pass through the membrane.

    (d) Plasma membranes contain chitin sugar in plants

CHAPTER 6

TISSUES

1. Name the cells which transmit the stimulus very rapidly from one place to another within the body.

   ----

2. Name the connective tissue that is found between skin and muscles.

   ----

3. Name the tissue which:
   (i) allows buoyancy to aquatic plants
   (ii) provides flexibility to plants

   (a)--

   (b)--
   ----

4. What is the function of sieve tube cells and how are they designed to carry out their function?

   ----

5. Name the basic packing tissue in the form of a few layers of cells.

   ----

6. In a temporary mount of a leaf epidermis, we observe small pores.
   (a) What are the pores present in leaf epidermis called?
   (b) How are these pores beneficial to the plant?

   (a)--

(b)--

7. What is epidermis? What is its role?

----

8. State the difference between the outer layer of the tissue of a branch of a tree and the outer layer of a young tree stem.

----

9. How is striated squamous epithelial tissue different from squamous epithelial tissue?

----

10. Give one word for the following:
    (a) Group of cells with similar structure and designed to give highest efficiency of function.
    (b) The process of taking up a permanent shape, size and function
    (c) Animal tissue connecting muscle to bones
    (d) Kidney shaped cells that enclose stomata.

    (a)--

    (b)--

    (c)--

    (d)--

11. Which parts of our body are composed of nervous tissue? Name the cells that make up the nervous tissue.

----

12. (a) Voluntary muscles are also known as skeletal muscles. Justify
    (b) Give two structured characteristics of these voluntary muscles.

    (a)--

    (b)--

    ----

13. Differentiate Chlorenchyma and Aerenchyma.

    ----

14. Differentiate between striated, unstriated and cardiac muscles on the basis of their structure and site/ location in the body.

    ----

15. Draw a diagrammatic labelled sketch of stem tip to show the location of meristematic tissue. Mention the function of each meristematic tissue.

    ----

16. Differentiate between bone and cartilage.

17. Differentiate between xylem and phloem tissues.

18. (a) Name the elements that make up the phloem tissue.
    (b) Which of these elements is responsible for transportation?
    (c) Which of these elements is dead?

    (a) --

    (b) --

    (c) --

19. Discuss the cell arrangement which supports the fact that epidermis is a protective tissue.

20. Explain how the bark of a tree is formed. How does it act as protective tissue?

21. List any six characteristics of parenchyma tissue.

22. What do you understand by complex tissue? Name the two types of complex permanent tissue present in plants give one function of each complex tissue.

23. Name the tissue found in the following locations:
     (a) Haversian canal,(b) Chondrocyte,(c) Eosinophils
     Give one function of each of these.

     (a)

(b) --

(c) --

24. Write two similarities and four differences between striated and cardiac muscles.

25. Differentiate between bone and cartilage with respect to structure, function and location.

26. Take a table to show the difference between striated, unstriated and cardiac muscles on the basis of their structure and location in the body.

27. Draw diagrams to show the difference between the structures of the three types of muscles fibres.

28. Write the functions of ligaments and tendons.

29. Name a connective tissue which is the hardest. What makes it so hard? List any three important functions of this tissue.

30. Differentiate between tendons and ligaments with respect to their structure, nature and function.

31. Based upon cell shape, cell wall and intercellular spaces, prepare a comparative study table between parenchyma, collenchymas and sclerenchyma. Which of these tissues is dead?

32. What is a nervous tissue? Give its functions. Explain the structure of a neuron with a diagram.

33. Draw the labeled diagram of a section of phloem. Name the four types of elements found in phloem. With respect to conduction, what is the main difference between xylem and phloem?

----

34. What is a meristematic tissue? State its different types. Show their locations in a diagram of a plant body. Give classification of meristems.

----

35. Name two simple permanent tissues which have living cells. Write two distinguishing features of each. Mention their location and functions.

----

36. Name the tissue which is responsible for increase in length of stem and root.

----

37. Name the four elements of phloem

38. What is source of cork ?

39. How many types of meristematic tissues are there on the basis of their presence ?

40. Explain the process of formation of cork.

41. Write the location and function of collenchyma tissue.

42. Name the living component common to both the complex permanent tissues found in plants. What is its function ?

----

43.   Name the following tissues :
      (a) The connective tissue found between the skin and muscles.
      (b) The tissue which connects two bones.
      (c) The epithelial tissue which forms the lining of the kidney tubules.
      (d) The tissue which is present in the veins of leaves.

      (a) ---

      (b) ---

      (c) ---

      (d) ---
          ----

44.   (a) Differentiate between epidermal and cork cells.
      (b) Why are they called protective tissues ?

      (a) ---

      (b) ---
          ----

45.   (a) State one point of difference between xylem and phloem.
      (b) Draw a neat diagram of xylem vessel and a tracheid.

      (a) ---

      (b) ---
          ----

46.   List two characteristics of cork. How is it formed ? Mention its role in trees.

      ----

47.   When stained appropriately, the muscle cell which shows alternate light and dark bands is :
      (a) striated   (b) smooth
      (c) cardiac   (d) unstriated

      ----

48. A student noted down the following observations while looking into a permanent slide under a microscope :
    (i) Cells are long and cylindrical.
    (ii) Light and dark bands are present giving striated appearance.
    It could be a :
    (a) slide of smooth muscle fibre
    (b) slide of striated muscle fibre
    (c) slide of neuron
    (d) slide of parenchyma cells.

    ----

49. The tissues which consist of relatively unspecialised living cells with thin cell wall and intercellular spaces are :
    (a) parenchyma tissue
    (b) collenchyma tissue
    (c) sclerenchyma tissue
    (d) meristematic tissue

    ----

50. A student was asked to write the characteristic features of nerve cell after viewing it under the microscope. The correct feature will be :
    (a) oval shaped cells with lobed nucleus
    (b) spindle shaped cells with band
    (c) loosely packed cells floating in matrix
    (d) a cell body with branched cytoplasmic extensions at one end and a long projection at the other end.

    ----

51. Write three distinguishing features between cells of meristematic and permanent plant tissues.

    ----

52. Explain how the bark of a tree is formed. How does it act as a protective tissue ?

    ----

53. Give reasons for the following :
    (a) Bark of a tree is impervious to gases and water.
    (b) In desert plants, epidermis has a thick waxy coating.
    (c) Epidermal cells of the roots generally have hair like parts.

    (a) --

    (b) --

    (c) --
    ----

54. Give reasons for the following :
    (a) Cells of sclerenchyma tissue have a narrow lumen.
    (b) Branches of a tree move and bend freely in high wind velocity.
    (c) It is difficult to pull out the husk of coconut.

    (a) --

    (b) --

    (c) --
    ----

55. The growth of plant occurs only in specific regions:
    (i) Name the tissue which is responsible for this growth.
    (ii) State the different types of this tissue.
    (iii) Write one function of each of the above mentioned tissue.

    (i) --

    (ii) --

    (iii) --
    ----

56. (a) Voluntary muscles are also known as skeletal muscles. Justify.
    (b) Give two structural characteristics of these voluntary muscles.

    (a) --

(b) ------------------------------------

57. Why are plants and animals made up of different tissues ?

58. A horse and a mango tree are both complex living organisms with specialised yet different tissue systems to perform the basic life processes. Give two reasons for possessing different tissues to perform similar functions.

59. (a) Name the connective tissue which connects two bones.
    (b) Name the connective tissue present in external ear.

    (a) ------------------------------------

    (b) ------------------------------------

60. Give two reasons, why is blood considered to be connective tissue ?

61. Name the tissue which helps in transportation of oxygen that we inhale to various parts of our body. Write the composition of this tissue.

----

62. Describe the structure, function and location of the nervous tissue.

----

63. Draw a diagram of cardiac muscle and label any two parts. Write one main function of cardiac muscle.

----

64. Name any three connective tissues. Give any one function of each.

----

65. What will happen if :
     (i) Apical meristem is damaged or cut ?
     (ii) Cork is not formed in older stems and roots ?
     (iii) Lymph is not returned to blood ?

     (i) --

(ii) --

(iii) --

----

66. What will happen if
   (i) Ligament gets overstretched ?
   (ii) Heparin is absent in blood ?
   (iii) Striated muscles contract rapidly for longer duration ?

   (i) --

   (ii) --

   (iii) --

   ----

67. What is Synapse ? Explain.

   ----

68. Do all cells of our body look like in terms of shape, size and structure? What similarities do they have? Illustrate by drawing diagrams of various cells present in human body.

   ----

69. All animals depend on plants for their food. Hard work of several years has resulted in the development of tissue culture technology by scientists. What can be the application of such technology in the present society ?

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70. What is apical meristem ? What is its function

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_____

71. Identify the simple permanent plant tissue with the following descriptions and also mention their location in the plant body :
   (a) Cells have irregular wall thickenings.
   (b) Tissues with large intercellular spaces and cells having large air cavity.
   (c) Cells are long, narrow and dead in nature.

   (a) _____
   _____
   _____

   (b) _____
   _____
   _____

   (c) _____
   _____

72. Identify the type of muscular tissues having following characteristics :
   (i) cylindrical, branched and uninucleated.
   (ii) long with pointed ends and uninucleated.
   (iii) long cylindrical, unbranched and multinucleated.

   (i) _____
   _____

   (ii) _____
   _____

   (iii) _____
   _____

73. Give an account of the structure, position and functions of the various types of epithelium tissue.

----

74. Ravi saw a man making ropes from the husk of coconut. Ravi went near the man and asked him how ropes can be made from the covering of coconut. That man told him that husk of coconut is very strong and is a type of plant tissue.

Objective Questions

6.01 Which of the following tissues has dead cells?

  (a) Parenchyma

  (b) Sclerenchyma

  (c) Collenchyma

  (d) Epithelial tissue

6.02 Find out incorrect sentence

  (a) Parenchymatous tissues have intercellular spaces

  (b) Collenchymatous tissues are irregularly thickened at corners

  (c) Apical and intercalary meristems are permanent tissues

  (d) Meristematic tissues, in its early stage, lack vacuoles

6.03 Girth of stem increases due to

  (a) apical meristem

  (b) lateral meristem

  (c) intercalary meristem

  (d) vertical meristem

6.04 Which cell does not have perforated cell wall?

  (a) Tracheids

  (b) Companion cells

  (c) Sieve tubes

  (d) Vessels

6.05 Intestine absorb the digested food materials. What type of epithelial cells are responsible for that?

  (a) Stratified squamous epithelium

  (b) Columnar epithelium

  (c) Spindle fibres

  (d) Cuboidal epithelium

6.06 A person met with an accident in which two long bones of hand were dislocated. Which among the following may be the possible reason?

  (a) Tendon break

  (b) Break of skeletal muscle

  (c) Ligament break

  (d) Areolar tissue break

6.07 While doing work and running, you move your organs like hands, legs etc. Which among the following is correct?

  (a) Smooth muscles contract and pull the ligament to move the bones

  (b) Smooth muscles contract and pull the tendons to move the bones

  (c) Skeletal muscles contract and pull the ligament to move the bones

  (d) Skeletal muscles contract and pull the tendon to move the bones

6.08 Which muscles act involuntarily?

  (i) Striated muscles

  (ii) Smooth muscles

  (iii) Cardiac muscles

  (iv) Skeletal muslces

  (a) (i) and (ii)

  (b) (ii) and (iii)

  (c) (iii) and (iv)

  (d) (i) and (iv)

6.09 Meristematic tissues in plants are

  (a) localised and permanent

  (b) not limited to certain regions

  (c) localised and dividing cells

  (d) growing in volume

6.10 Which is not a function of epidermis?

  (a) Protection from adverse condition

  (b) Gaseous exchange

  (c) Conduction of water

(d) Transpiration

6.11 Select the incorrect sentence

(a) Blood has matrix containing proteins, salts and hormones

(b) Two bones are connected with ligament

(c) Tendons are non-fibrous tissue and fragile

(d) Cartilage is a form of connective tissue

6.12 Cartilage is not found in

(a) nose

(b) ear

(c) kidney

(d) larynx

6.13 Fats are stored in human body as

(a) cuboidal epithelium

(b) adipose tissue

(c) bones

(d) cartilage

6.14 Bone matrix is rich in

(a) fluoride and calcium

(b) calcium and phosphorus

(c) calcium and potassium

(d) phosphorus and potassium

6.15 Contractile proteins are found in

(a) bones

(b) blood

(c) muscles

(d) cartilage

6.16 Voluntary muscles are found in

(a) alimentary canal

(b) limbs

(c) iris of the eye

(d) bronchi of lungs

6.17 Nervous tissue is not found in

(a) brain

(b) spinal cord

(c) tendons

(d) nerves

6.18 Nerve cell does not contain

(a) axon

(b) nerve endings

(c) tendons

(d) dendrites

6.19 Which of the following helps in repair of tissue and fills up the space inside the organ?

(a) Tendon

(b) Adipose tissue

(c) Areolar

(d) Cartilage

6.20 The muscular tissue which function throughout the life continuously without fatigue is

(a) skeletal muscle

(b) cardiac muscle

(c) smooth muscle

(d) voluntary muscle

6.21 Which of the following cells is found in the cartilaginous tissue of the body?

(a) Mast cells

(b) Basophils

(c) Osteocytes

(d) Chondrocytes

6.22 The dead element present in the phloem is

(a) companion cells

(b) phloem fibres

(c) phloem parenchyma

(d) sieve tubes

6.23 Which of the following does not lose their nucleus at maturity?

(a) Companion cells

(b) Red blood cells

(c) Vessel

(d) Sieve tube cells

6.24 In desert plants, rate of water loss gets reduced due to the presence of

(a) cuticle

(b) stomata

(c) lignin

(d) suberin

6.25 A long tree has several branches. The tissue that helps in the side ways conduction of water in the branches is

(a) collenchyma

(b) xylem parenchyma

(c) parenchyma

(d) xylem vessels

6.26 If the tip of sugarcane plant is removed from the field, even then it keeps on growing in length. It is due to the presence of

(a) cambium

(b) apical meristem

(c) lateral meristem

(d) intercalary meristem

6.27 A nail is inserted in the trunk of a tree at a height of 1 metre from the ground level. After 3 years the nail will

(a) move downwards

(b) move upwards

(c) remain at the same position

(d) move sideways

6.28 Parenchyma cells are

(a) relatively unspecified and thin walled

(b) thick walled and specialised

(c) lignified

(d) none of these

6.29 Flexibility in plants is due to

(a) collenchyma

(b) sclerenchyma

(c) parenchyma

(d) chlorenchyma

6.30 Cork cells are made impervious to water and gases by the presence of

(a) cellulose

(b) lipids

(c) suberin

(d) lignin

6.31 Survival of plants in terrestrial environment has been made possible by the presence of

(a) intercalary meristem

(b) conducting tissue

(c) apical meristem

(d) parenchymatous tissue

6.32 Choose the wrong statement

(a) The nature of matrix differs according to the function of the tissue

(b) Fats are stored below the skin and in between the internal organs

(c) Epithelial tissues have intercellular spaces between them

(d) Cells of striated muscles are multinucleate and unbranched

6.33 The water conducting tissue generally present in gymnosperm is

(a) vessels

(b) sieve tube

(c) tracheids

(d) xylem fibres

CHAPTER 8

MOTION

1. A object goes from point X to Y and then come back from Y to X. What is the displacement and average velocity?

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2. Write down the difference between Scalars and Vectors?

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3. What is the difference between Uniform Accelerated and Non Uniform accelerated motion?

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4. What happens to speed, velocity acceleration when an object moves in a circle with uniform speed?

5. When an object is thrown upwards, what is true of velocity and acceleration at the highest point of motion of the object?

6. True and False Statements
   A. Displacement can be zero but distance never_____
   B. Displacement magnitude can be greater than distance travelled by the object_____
   C. Time is a vector quantity_____
   D. If the velocity of the body decreases with time, the acceleration is negative (retardation), and the motion is called decelerated motion_____
   E. The area of the velocity time graph gives displacement of the body_____
   F. Acceleration is a scalar quantity_____
   G. Motion and rest are relative terms_____
   I. an object can be moving with Uniform speed but variable acceleration_____

7. Difference between Speed and Velocity?

8. An air-plane accelerates down a runway at 3.20 m/s² for 32.8 s until is finally lifts off the ground. Determine the distance travelled before take off.

9. A Jeep starts from rest and accelerates uniformly over a time of 5.21 seconds for a distance of 110 m. Determine the acceleration of the Jeep.

10. John is riding the Giant Drop at Canada. If John free falls for 2.6 seconds, what will be his final velocity and how far will he fall?

11. A racing car accelerates uniformly from 18.5 m/s to 46.1 m/s in 2.47 seconds. Determine the acceleration of the car and the distance travelled.

12. A feather is dropped on the planet other than earth which has very low acceleration due to gravity from a height of 1.40 meters. The acceleration of gravity on the other planet is 1.67 m/s². Determine the time of feather to fall to the surface of the other planet

13. Rocket-powered sleds are used to test the human response to acceleration. If a rocket-powered sled is accelerated to a speed of 444 m/s in 1.8 seconds, then what is the acceleration and what is the distance that the sled travels?

14. Honda Activa accelerates uniformly from rest to a speed of 7.10 m/s over a distance of 35.4 m. Determine the acceleration of the bike.

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15. An Aeronautics engineer is designing the runway for an airport. Of the planes that will use the airport, the lowest acceleration rate is likely to be 3 m/s². The take off speed for this plane will be 65 m/s. Assuming this minimum acceleration, what is the minimum allowed length for the runway?

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16. A BMW car travelling at 22.4 m/s skids to a stop in 2.55 s. Determine the skidding distance of the car (assume uniform acceleration)

----

17. A bullet leaves a rifle with a muzzle velocity of 521 m/s. While accelerating through the barrel of the riffle, the bullet moves a distance of 0.840 m. Determine the acceleration of the bullet (assume a uniform acceleration).

18. A baseball is popped straight up into the air and has a hang- time of 6.25 s. Determine the height to which the ball rises before it reaches its peak. (Hint: the time to rise to the peak is one- half the total hang-time.)

19. The observation deck of the tall skyscraper 370 m above the street. Determine the time required for a penny to free fall from the deck to the street below.

20. A coin is dropped into a deep well and is heard to hit the water 3.41 s after being dropped. Determine the depth of the well.

21. A plane has a take off speed of 88.3 m/s and requires 1365 m to reach that speed. Determine the acceleration of the plane and the time required to reach this speed.

22. A particle is moving in a circle of diameter 5m. Calculate the distance covered and the displacement when it competes 3 revolutions.

23. A body thrown vertically upwards reaches a maximum height 'h'. It then returns to ground. Calculate the distance travelled and the displacement.

24. A body travels a distance of 15m from A to B and then moves a distance of 20m at right angles to AB. Calculate the total distance travelled and the displacement.

25. An object travels 16m in 4s and then another 16m in 2s. What is the average speed of the object?

26. Tony swims in a 90m long pool. He covers 180m in one minute by swimming from one end to the other and back along the same straight path. Find the average speed and average velocity of Tony.

27. In along distance race, the athletics were expected to take four rounds of the track such that the line of finish was same as the line of start. Suppose the length of the track was 200m.

28. A dragster accelerates to a speed of 112 m/s over a distance of 398 m. Determine the acceleration (Assume uniform) of the dragster.

29. With what speed in miles/ h (1 m/s= 2.23 mi/hr) must an object be thrown to reach a height of 91.5 m (equivalent to one football field)? Assume negligible air resistance.

30. A particle is moving up an inclined plane. Its velocity changes from 15m/s to 10m/s in two seconds. What is its acceleration?

31. The velocity changes from 45m/s to 60m/s in Three seconds. What is its acceleration?

32. A body covered a distance of z metre along a semicircular path. Calculate the magnitude of displacement of the body, and the ratio of distance to displacement?

33. A Truck covers 30km at a uniform speed of 30km/hr. what should be its speed for the next 90km if the average speed for the entire journey is 60km/h?

34. An object moves along a circular path of diameter 14cm with constant speed. If it takes 2 min. to move from a point on the path to the diametrically opposite point. Find
(a) The distance covered by the object
(b) The speed
(c) The displacement
(d) average velocity.

(a)

(b)

(c)

(d)

35. A particle is pushed along a horizontal surface in such a way that it starts with a velocity of 12m/s. Its velocity decreases at a uniform rate of 0.5m/s^2.
(a) Find the time it will take to come to rest.
(b) Find the distance covered by it before coming to rest?

(a)

(b)

36. A train accelerated from 20km/hr to 80km/hr in 4 minutes. How much distance does it cover in this period? Assume that the tracks are straight?

37. Starting from a stationary position, Bhuvan paddles his bicycle to attain a velocity of 6m/s in 30s. Then he applies brakes such that the velocity of bicycle comes down to 4m/s in the next 5s. Calculate the acceleration of the bicycle in both the cases.

38. The odometer of a car reads 2000 km at the start of a trip and 2400km at the end of the trip. If the trip took 8 hr, calculate the average speed of the car in km/hr and m/s.

39. An electric train is moving with a velocity of 120km/hr. How much distance will it move in 30s?

40. A body is moving with a velocity of 15m/s. If the motion is uniform, what will be the velocity after 10s?

41. A train travels some distance with a speed of 30km/hr and returns with a speed of 45km/hr.

42. A car travels along a straight line for first half time with speed 40km/hr and the second half time with speed 60km/hr. Find the average speed of the car.

43. A body starts rolling over a horizontal surface with an initial velocity of 0.5m/s. Due to friction, its velocity decreases at the rate of $0.05 m/s^2$. How much time will it take for the body to stop?

44. A cyclist moving on a circular track of radius 50m completes one revolution in 4 minutes. What is his
(a) average speed
(b) average velocity in one full revolution?

(a)

(b)

45. Two object are thrown vertically upwards simultaneously with their velocities x and y respectively. Prove that
(a) The heights reached by them would be in the ratio of $x^2 : y^2$
(b) The time taken to reach the maximum height would be in the ratio of x:y
  (Assume upward acceleration is –g and downward acceleration to be +g).

  (a)--

  (b)--

  ----

46. A car increases its speed from 20 km/h to 50 km/h in 10 seconds. What is its acceleration?

47. A ship is moving at a speed of 56km/h. One second later, it is moving at 58km/h. What is its acceleration?

48. A scooter acquires a velocity of 36km/h in 10 seconds just after the start. Calculate the acceleration of the scoter.

49. A racing car has uniform acceleration of 4m/s^2. What distance will it cover in 10 seconds after start?

50. A body is accelerating at a constant rate of 10m/s^2. If the body starts from rest, how much distance will it cover in 2 seconds?

51. An object undergoes an acceleration of 8m/s^2 starting from rest. Find the distance travelled in 1 second.

52. A moving train is brought to rest within 20 seconds by applying brakes. Find the initial velocity, if the retardation due to brakes is 2m/s².

53. A car accelerates uniformly from 18km/h to 36 km/h in 5 seconds. Calculate acceleration and the distance covered by the car in that time.

54. A body starts to slide over a horizontal surface with an initial velocity of 0.5 m/s. Due to friction, its velocity decreases at the rate of 0.05 m/s². How much time will it take for the body to stop?

55. A train starting from the rest moves with a uniform acceleration of 0.2 m/s² for 5 minutes. Calculate the speed acquired and the distance travelled in this time.

56. True and false questions
    (a) Displacement cannot be zero_____
    (b) Average speed= Total distance/time_____
    (c) Average velocity = Total displacement /time_____
    (d) slope of distance-time graph indicates the speed_____
    (e) It is possible to have Object moving with uniform speed but variable acceleration._____
    (f) It is possible to have Object moving with uniform velocity but non-uniform acceleration.____

57. Marc runs from one end to the other end of a semicircular track whose radius is 140m. What is the distance covered by the marc and what is his displacement?

58. A jogger moves 500m in 2 minutes and next 1000m in 30s on the same straight path. What is his average speed and average velocity?

59. A big truck moving along a straight line at a speed of 54km/hr stop in 5s after the breaks are applied.
    (a) Find the acceleration, assuming it to constant.
    (b) Plot the graph of speed versus time.
    (c) Using the graph. Find the distance covered by the car after the brakes are applied?
       (a)--

(b)--

(c)--

60. A swimmer swims 90m long pool. He covers the distance of 180m by swimming from one end to other end back along the same path. If he covers the first 90m at speed of 2m/s, then how fast he swim so that his average speed is 3m/s?

61. A bus was moving with a speed of 54 km/h. On applying brakes, it stopped in 8 seconds. Calculate the acceleration and the distance travelled before stopping.

62. A motor cycle moving with a speed of 5 m/s is subjected to an acceleration of 0.2 m/s². Calculate the speed of the motor cycle after 10 seconds and the distance travelled in this time.

63. The brakes applied to a car produce an acceleration of 6 m/s² in the opposite direction to the motion. If the car takes 2 seconds to stop after the application of brakes, calculate the distance it travels during this time.

64. A train starting from rest attains a velocity of 72 km/h in 5 minutes. Assuming that the acceleration is uniform, find the acceleration and the distance travelled by the train for attaining this velocity.

65. Calculate the speed of the tip of second's hand of a watch of length 1.5 cm.

66. The length of minutes hand of a clock in 5 cm. Calculate its speed.

67. Calculate the force needed to speed up a car with a rate of $5ms^{-2}$, if the mass of the car is 1000 kg.

68. If the mass of a moving object is 50 kg, what force will be required to speed up the object at a rate of $2ms^{-2}$?

69. To accelerate a vehicle to $3m/s^2$ what force will be needed if the mass of the vehicle is equal to 100 kg?

70. To accelerate an object to a rate of $2m/s^2$, 10 N force is required. Find the mass of object.

71. If 1000 N force is required to accelerate an object to the rate of 5m/s², what will be the weight of the object?

72. A vehicle accelerate at the rate of 10m/s² after the applying of force equal to 50000 N. Find the mass of the vehicle.

73. What the acceleration a vehicle having 1000 kg of mass will get after applying a force of 5000N?

74. After applying a force of 1000 N an object of mass 2000 kg will achieve what acceleration?

75. An object requires the force of 100N to achieve the acceleration 'a'. If the mass of the object is 500 kg what will be the value of 'a'?

76. Find the recoil velocity of a gun having mass equal to 5 kg, if a bullet of 25gm acquires the velocity of 500m/s after firing from the gun.

77. An object has moved through a distance. Can it have zero displacement? If yes, support your answer with an example.

78. When will you say a body is in:
    (i) Uniform acceleration?
    (ii) Non-uniform acceleration?

    (i)

(ii)

79.　State which of the following situations are possible and give an example for each of these:
　(a) An object with a constant acceleration but with zero velocity.
　(b) An object moving in a certain direction with acceleration in the perpendicular direction.
　　(a)

　　(b)

Objective Questions

8.01 A particle is moving in a circular path of radius r. The displacement after half a circle would be:

(a) Zero

(b) πr

(c) $2 r$

(d) $2\pi r$

8.02 A body is thrown vertically upward with velocity u, the greatest height h to which it will rise is,

(a) u/g

(b) u 2 /2g

(c) u 2 /g

(d) u/2g

8.03 The numerical ratio of displacement to distance for a moving object is

(a) always less than 1.

(b) always equal to 1.

(c) always more than 1.

(d) equal or less than 1

8.04 If the displacement of an object is proportional to square of time, then the object moves with

(a) uniform velocity

(b) uniform acceleration

(c) increasing acceleration

(d) decreasing acceleration

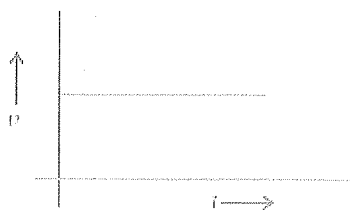8.05 From the given v – t graph (Fig. 8.1), it can be inferred that the object is

Fig. 8.1

(a) in uniform motion

(b) at rest

(c) in non-uniform motion

(d) moving with uniform acceleration

8.06 Suppose a boy is enjoying a ride on a merry-go-round which is moving with a constant speed of $10 \ ms^{-1}$. It implies that the boy is

(a) at rest

(b) moving with no acceleration

(c) in accelerated motion

(d) moving with uniform velocity

8.07 Area under a v – t graph represents a physical quantity which has the unit

(a) m^2

(b) m

(c) m^3

(d) ms^{-1}

8.08 Four cars A, B, C and D are moving on a level-led road. Their distance versus time graphs are shown in Fig. 8.2. Choose the correct statement
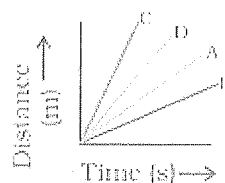
Fig. 8.2

(a) Car A is faster than car D.

(b) Car B is the slowest.

(c) Car D is faster than car C.

(d) Car C is the slowest.

8.09 Which of the following figures (Fig. 8.3) represents uniform motion of a moving object correctly?

Fig. 8.3

8.10 Slope of a velocity – time graph gives

(a) the distance

(b) the displacement

(c) the acceleration

(d) the speed

8.11 In which of the following cases of motions, the distance moved and the magnitude of displacement are equal?

(a) If the car is moving on straight road

(b) If the car is moving in circular path

(c) The pendulum is moving to and fro

(d) The earth is revolving around the Sun

CHAPTER 9

FORCE AND LAWS OF MOTION

1. Which is true from Newton's Third law of motion?
   (a) For every action force there is a 50% reaction force in the opposite direction.
   (b) For every action force there is an equivalent reaction force in the opposite direction.
   (c) Both 1 and 2
   (d) None of the above

   ----

2. According to the third law of motion when we push on an object, the object pushes back on us with an equal and opposite force. If the object is a massive truck parked along the roadside, it will probably not move. A student justifies this by answering that the two opposite and equal forces cancel each other. Comment on this logic and explain why the truck does not move?
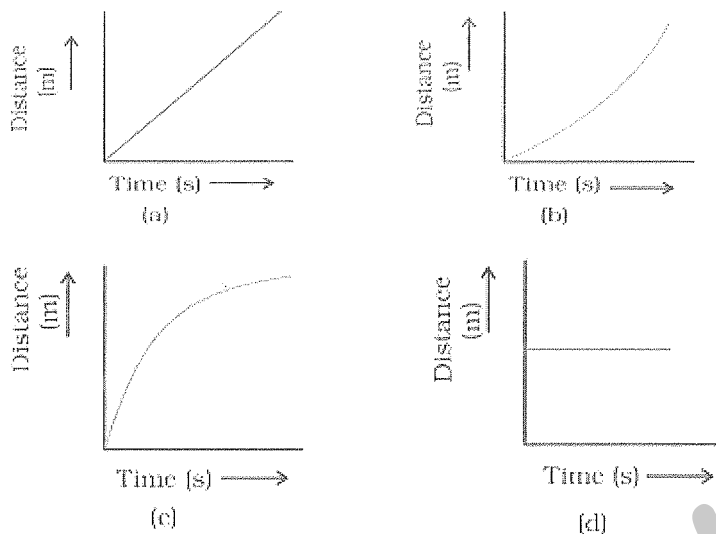

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3. Arrange the items in order of increasing inertia?Bicycle, bus, Train, car, Scooter

4. What is the difference between balanced force and unbalanced force?

5. Newton's First Law of Motion is also called:
   (a) Law of Friction
   (b) Law of Reaction
   (c) Law of Action
   (d) Law of Inertia

6. State the various effects of force?

7. True and False Statements
   (a) Momentum is a vector quantity_____
   (b) Rate of change of momentum is called Force_____
   (c) Inertia is that property of a body due to which it resists a change in its state of rest or of uniform motion_____
   (d) when a bullet is fired from the Gun and gun recoil. This is based on law of inertia_____
   (e) The unit of momentum is Kg-m_____
   (f) Force is a scalar quantity_____
   (g) Action Reaction pair of force act on different body_____
   (h) A object can still run with non-zero velocity event the net force acting on the body is zero_____

8. State the Law of Conservation of Momentum. Deduce this from Newton's second law of motion?

9. What is impulse? Prove that Impulse is equal to change in momentum?

----

10. Name the physical quantity that measures inertia. State its SI unit.

----

11. Name the property of bodies by virtue of which they resist a change in their state of rest or of uniform motion.

----

12. What is the momentum of a body of mass 5 kg moving with a velocity of 0.20 m/s.

----

13. Write the net force acting on a bus, of mass 2000 kg, moving with a uniform velocity of 60 km/h.

----

14. State the relation between the momentum of a body and the force acting on it.

----

15. A body of mass 25 kg has a momentum of 125 kg m/s. calculate the velocity of the body.

16. State Newton's third law of motion.

17. An object of mass 100 kg is accelerated uniformly from a velocity of 5 m/s to 8 m/s in 6 s. Calculates the initial and final momentum of the object. Also find the magnitude of force exerted on the object.

18. Out of the four physical quantities associated with the motion of an object viz force, velocity, acceleration and momentum which one remains constant for all bodies large or small, undergoing a free fall?

19. How are action – reaction forces related in magnitude and direction?

20. State the relation between the momentum of a body and the force acting on it.

21. State all the law Newton's law of Motion? And Give example for each law

22. What is the law of conservation of Momentum? A car of mass 200 kg moving with 3m/s collides with another car of mass 300 Kg moving in the same direction at 2 m/s .They collide and move together after that. What is the common velocity?

23. During the game of table tennis, if the ball hits a player it does not hurt him. On the other hand when a fast moving cricket ball hits a spectator it may hurt him. State reason.

24. Why do a back seater moves forward when a fast moving bike is stopped suddenly?

25. Explain these statements
    (a) when an cyclist moving stop pedaling ,Cycle get stops after some time. Which force is responsible for stopping
    (b) Why people sitting in bus fall backward when bus suddenly starts?
    (c) A karate player can break a pile of tiles with a single blow of his hand?
    (d) When a hanging carpet is beaten with stick ,the dust particle start coming out of it?

    (a)

    (b)

(c)--

(d)--

26. There are three solids made up of aluminium, steel and wood, of the same shape and same volume. Which of them would have highest inertia?

27. Two friends on roller – skates are standing 5 m apart facing each other. One of them throws a ball of 2 kg towards the other, who catches it. How will this activity affect the position of the two? Explain your answer.

28. Give reason and give the law related to these statements:
(a) It is easier to push an empty box than to push the box full of books.
(b) It is difficult for a fireman to hold a hose which ejects large amount of water with high velocity.
(a)--

(b)

29.   Which of the following has more inertia? Give reason for your answer:
   (i) A bicycle and a train
   (ii) A rubber ball and a stone of the size.
   (iii) A five rupee coin and a one rupee coin.
   (iv) A bicycle or a truck.

30.   Two objects A and B of same masses and velocity V and 3 V respectively are in motion.
   (a) Which object will have larger momentum?
   (b) Give reason to support your answer 'a'.

       (a)

       (b)

31.   While playing football, the goalkeeper did not get sufficient time to stop a fast ball shot towards him. Why did he hurt his hand while doing so?

32.   The hand gets hurt while punching a wall. Why?
   (i) Explain why is it difficult for a fireman to hold a hose, which ejects a large amount of water at a high velocity.

(ii) Why action and reaction do not cancel each other?

(i)--

(ii)---

----

33. What is the effect force, when it is applied in the following cases?
(a) Balloon is pressed from opposite sides.
(b) A ball is hit with a bat.
(c) Spring is compressed.

(a)--

(b)--

(c)--

----

34. An 8000 kg engine pulls a train of 5 wagons, each of 2000 kg along a horizontal track. If the engine exerts a force of 40000 N and the track offers a friction force of 5000 N, then calculate:
    (a) The net accelerating force;
    (b) The acceleration of the train; and
    (c) The force of wagon 1 on wagon 2.

    (a)---

    (b)---

    (c)---

----

35. Question In the following example, try to identify the number of times the velocity of the ball changes:
    "A football player kicks a football to another player of his team who kicks the football towards the goal. The goalkeeper of the opposite team collects the football and kicks it towards a player of his own team". Also identify the agent supplying the force in each case.

36. How much net force is required to accelerate a 1000 kg car at 4.00 m/s²?

37. A pile of carom coins is hit with a fast sliding strike. What happens to the carom coins and why?

38. A stone released from the top of a tower of height 19.6 m. calculate its final velocity just before touching the ground.

39. Define SI unit of force. A force of 2 N acting on a body changes its velocity uniformly from 2 m/s to 5 m/s in 10 s. calculate the mass of the body.

40. A body of mass 1 kg undergoes a change of velocity of 4m/s in 4s what is the force acting on it?

41. A sedan car of mass 200kg is moving with a certain velocity . It is brought to rest by the application of brakes, within a distance of 20m when the average resistance being offered to it is 500N. What was the velocity of the motor car?

42. A driver accelerates his car first at the rate of 4 m/s^2 and then at the rate of 8 m/s^2 .Calculate the ration of the forces exerted by the engines?

43. An object of mass 10 g is sliding with a constant velocity of 2 m/ s on a frictionless horizontal table. The force required to keep the object moving with the same velocity is

44. A cricket ball of mass 0.20 kg is moving with a velocity of 1.2m/s . Find the impulse on the ball and average force applied by the player if he is able to stop the ball in 0.10s?

45. Two objects of masses of 100 gm and 200 gm are moving in along the same line and direction with velocities of 2 ms^{-1} and 1 ms^{-1} respectively. They collide and after collision, the first object moves at a velocity of 1.67 ms^{-1}. Determine the velocity of the second object?

46. Sanju leaves his house at 8.30 a.m. for his school. The school is 2 km away and classes start at 9.00 a.m. If he walks at a speed of 3 km/h for the first kilometer, at what speed should he walk the second kilometer to reach just in time?

47. An object of mass 1kg acquires a speed of 10 m/s when pushed forward. What is the impulse given to the object?

48. A bullet of mass 10 gm is fired with an initial velocity of 20 m/s from a rifle of mass 4 kg. Calculate the initial recoil velocity of the rifle?

49. Why is it advised to tie the luggage with a rope on the roof buses?

------

50. State any three changes that a force brings about on a body. Give one example of each.

------

51. Tabulate two differences between balanced and unbalanced forces. Write one example of each.

------

52. A book slides down a table top and comes to rest position after a certain distance. Name the force acting on the book. What types of forces are acting on the book? (Balanced/ unbalanced). Which force brought the book to rest?

------

53. The mud particles sticking on the rim of a bicycle wheel leave the rim of the wheel tangentially when it starts moving. Explain.

54. When a motor car makes a sharp turn at a high speed, we tend to get thrown to one side. Why?

55. What do you understand by inertia? Do all bodies have the same inertia? Illustrate giving an example.

56. A passenger in a moving train tosses a coin which falls behind him. It means that motion of the train is
(a) accelerated   (b) uniform   (c) retarded   (d) along circular tracks

57. A stone of mass 1 kg is thrown with a velocity 20 m/s across the frozen surface of a lake and comes to rest after travelling a distance of 50 m. what is the force of friction between the stone and ice?

58. Answer the following:
(a) What is meant by momentum of a body? How can it be measured? Write its SI units.
(b) Explain how does Newton's first law give the qualitative definition of force?

(a)

(b)

59. Two objects A and B, having mass 100 kg and 75 kg, moving with velocity 40 km/hr and 6 km/hr respectively. Answer the following:
(a) Which will have greater inertia?
(b) Which will have greater momentum?
(c) Which will stop first if equal negative acceleration is applied on both?
(d) Which will travel greater distance?

(e) Which will impart greater impulse if collides with a wall?

(a)--

(b)--

(c)--

(d)--

(e)--

----

60. A truck of mass M is moved under a force F. If the truck is then loaded with an object equal to the mass of the truck and the driving force is halved, then how does the acceleration change?.

----

61. Do action and reaction act on the same body or on different bodies? Explain your answer with the help of example. How are they related in magnitude and direction? Write the total momentum of the gun and the bullet before firing.

----

62. A bullet of mass 10 g moving with a velocity of 400 m/s gets embedded in a freely suspended wooden block of mass 900 g. what is the velocity acquired by the block?

----

63. State the law of conservation of momentum.Using this law explain why a gun recoils.

----

64. A stone released from the top of a tower of height 19.6 m, calculate its final velocity just before touching the ground. (Take $g = 9.8$ m/s^2)

----

65. A boy of mass 50 kg running 5 m/s jumps on to a 20 kg trolley travelling in the same direction at 1.5 m/s. find their common velocity.

66. Car A of mass 1500 kg travelling at 25 m/s collides with another car B of mass 1000 kg travelling at 15 m/s in the same direction. After collision, the velocity of car A becomes 20 m/s. Calculate the velocity of car B after collision.

67. A bridge is 500 m long. A 100 m long train crosses the bridge at a speed of 30 m/s. Find the time taken by train to cross it.

68. Why is the motion of satellites around their planets considered an accelerated motion ?

69. A motor cycle moving with a speed of 5 m/s obtains an acceleration of 0.2 m/s2. Calculate the speed of the motor cycle after 10 seconds, and the distance travelled by it in this time.

70. A car travelling at a speed of 10 m/s is brought to rest in 20 seconds by applying brakes. Calculate the acceleration and distance travelled during this time.

71. Define uniformly accelerated motion and uniform motion. Also write any two equations of uniformly accelerated motion.

72. Express average velocity when the velocity of a body changes at a non-uniform rate and a uniform rate.

73. (a) State the relation between distance and time :
    (i) When a body is moving with uniform velocity.
    (ii) When a body is moving with variable velocity.
    (b) How is distance different from displacement ?
    (c) A train is travelling at a speed of 90 km/h. Brakes are applied in the train so as to produce a uniform acceleration of $0 \cdot 5$ m/s². Find distance covered by train, before it is brought to rest ?

    (i)

    (ii)

(b)--

(c)--

----

74.   (a) Differentiate between distance and displacement.
      (b) Under what condition is distance and the magnitude of the displacement equal ?
      (c) The minute hand of a wall clock is 10 cm long.
      Find its displacement and the distance covered from 10 am to 10.30 am.

      (a)--

      (b)--

      (c)--

      ----

75.   (i) Define circular motion.
      (ii) What is the difference between uniform motion in a straight line and circular motion ?
      (iii) An athlete completes one round of a circular track of diameter 200 m in 40 sec. What will be
            the distance covered and the displacement at the end of 2 min and 20 sec ?

            (i)--

(ii)--

(iii)---

76. (a) Draw velocity-time graph for a body starting its motion with a velocity "u" and under uniform acceleration "a" it acquires a velocity "v" in time "t".
    (b) Using above graph, derive II equation of motion for position-time relation.
    (c) Explain how is it possible for an object to move with a constant speed but with uniform acceleration.

    (a)---

    (b)---

    (c)---

(d)

77.   (a) "First law of motion can be mathematically stated from the mathematical formulation of second law of motion." Justify this statement.

(b) A dumbbell of mass 10 kg falls on the floor from a height of 80 cm. Calculate the change in momentum of the dumb bell and also the force of impact on the floor. (given $g = 10$ m/s^2)

(a)

(b)

78.   A student performed the experiment, "To establish relationship between weight of a rectangular wooden block lying on a horizontal surface and minimum force required to just move it using a spring balance". It the weight of the given wooden block is nearly 200 g wt and three known weights of 100 g wt, each are to be successively placed on the wooden block to take three more readings, then which one of the following balances available in the laboratory would you select for the best results in the experiment ? It is known that a force of 90 g wt. is required to just move the block on the surface.

(a) Range 0–100g wt. ; Least count 1.0g wt.
(b) Range 0–200g wt. ; Least count 2.0g wt.
(c) Range 0–250g wt. ; Least count 2.0g wt
(d) Range 0–500g wt. ; Least count 5.0g wt.

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79. Akhtar, Kiran and Rahul were riding in a motorcar that was moving with a high velocity on an expressway when an insect hit the windshield and got stuck on the windscreen. Akhtar and Kiran started pondering over the situation.

(a) Kiran suggested that the insect suffered a greater change in momentum as compared to the change in momentum of the motorcar (because the change in the velocity of the insect was much more than that of the motorcar).

(b) Akhtar said that since the motorcar was moving with a larger velocity, it exerted a larger force on the insect. And as a result the insect died.

(c) Rahul while putting an entirely new explanation said that both the motorcar and the insect experienced the same force and a change in their momentum.

Comment on these suggestions.

(a)--

(b)--

(c)--

Objective Questions

9.01 Which of the following statement is not correct for an object moving along a straight path in an accelerated motion?

(a) Its speed keeps changing

(b) Its velocity always changes

(c) It always goes away from the earth

(d) A force is always acting on it

9.02 According to the third law of motion, action and reaction

(a) always act on the same body

(b) always act on different bodies in opposite directions

(c) have same magnitude and directions

(d) act on either body at normal to each other

9.03 A goalkeeper in a game of football pulls his hands backwards after holding the ball shot at the goal. This enables the goal keeper to

(a) exert larger force on the ball

(b) reduce the force exerted by the ball on hands

(c) increase the rate of change of momentum

(d) decrease the rate of change of momentum

9.04 The inertia of an object tends to cause the object

(a) to increase its speed

(b) to decrease its speed

(c) to resist any change in its state of motion

(d) to decelerate due to friction

9.05 A passenger in a moving train tosses a coin which falls behind him. It means that motion of the train is

(a) accelerated

(b) uniform

(c) retarded

(d) along circular tracks

9.05 An object of mass 2 kg is sliding with a constant velocity of $4 \, ms^{-1}$ on a frictionless horizontal table. The force required to keep the object moving with the same velocity is

(a) 32 N

(b) 0 N

(c) 2 N

(d) 8 N

9.07 Rocket works on the principle of conservation of

(a) mass

(b) energy

(c) momentum

(d) velocity

9.08 A water tanker filled up to 2/3 of its height is moving with a uniform speed. On sudden application of the brake, the water in the tank would

(a) move backward

(b) move forward

(c) be unaffected

(d) rise upwards

CHAPTER 10 GRAVITATION

1. The weight of an object on the moon is about …………………….. of its weight on the earth.

2. The value of g on the earth is about……………… of that on the moon.

3. If the weight of a body is 6 N on the moon, it will be about……………………… on the earth

4. If the radius of the earth were to decreases by 1%, keeping its mass same, how will the acceleration due to gravity change ?

   ----

5. Calculate the average density of the earth in terms of g, G and R.

   ----

6. The earth is acted upon by gravitation of Sun, even though it does not fall into the Sun. Why?

   ----

7. Calculate the density of Earth from Newton's law of gravitation.

   ----

8. A body weighs more at poles than at the equator of earth. Why?

9. Two particles of equal mass(m) move in a circle of radius (r) under the action of their mutual gravitational attraction. Find the speed of each particle.

10. The acceleration due to gravity on the moon is about............................ of that on the earth.

11. In order that the force of gravitation between two bodies may become noticeable and cause motion, one of the bodies must have an extremely large.................................

12. Two objects of masses m_1 and m_2 having the same size are dropped simultaneously from heights h_1 and h_2 respectively. Find out the ratio of time they would take in reaching the ground. Will this ratio remain the same if
   (i) one of the objects is hollow and the other one is solid and
   (ii) both of them are hollow, size remaining the same in each case. Give reason.

   (i)

   (ii)

13. Distinguish between mass and weight. Show that mass of a body numerically equal to weight of the body except at the centre of earth.

14. Calculate the force of gravity acting on your friend of mass 60kg. Given mass of earth = 6 x 10²⁴ kg and radius of Earth = 6.4 x 10⁶m.

15. Mass of an object is 10kg. What is its weight on Earth?

16. What is the mass of an object whose weight is 49N?

17. An object weighs 10N when measured on the surface of the earth. What would be its weight when measured on the surface of the Moon?

18. An object is thrown vertically upwards and rises to a height of 10m. Calculate (i) the velocity with which the object was thrown upwards and (ii) the time taken by the object to reach the highest point.

(i)

(ii)----------

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19. A force of 2 kg wt. acts on a body of mass 4.9kg. Calculate its al ratio.

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20. A force of 20N acts upon a body weight is 9.8N. What s the mass of the body and how much is its acceleration?

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21. A body has a weight of 10 kg on the surface of arth What will be its mass and weight when taken to the centre of earth?

---

22. How much would a 70 kg man weigh on moo ? What will be his mass on earth and moon? Given g on moon = 1.7 m/s^2.

---

23. The Earth's gravitational force causes an acceleration of 5 m/s^2 in a 1 kg mass somewhere in space. How much will the acceleration of a 3 kg mass be at the same place?

24. A particle is thrown p vertically with a velocity of 50m/s. What will be its velocity at the highest point of the journey? How high would the particle rise? What time would it take to reach the highest point? Take g = 10 m/s².

25. If a planet existed whose mass was twice that of Earth and whose radius 3 times greater, how much will a 1kg mass weigh on the planet?

26. A boy on cliff 49m high drops a stone. One second later, he throws a second stone after the first. They both hit the ground at the same time. With what speed did he throw the second stone?

27. A stone drops from the edge of a roof. It passes a window 2m high in 0.1s. How far is the roof above the top of the window?

28. What is the difference between mass and Weight?

29. Derive the inverse square of Newton.

30. Define 'G' and give its value.

31. A ball is thrown up with speed of 10 m/s. How high will it go before it begins to falls? (Take g=10m/s^2)

32. The weight of the man on earth is 150 N and on certain planet is 25 N. Take g=10m/s^2 on earth
    (a) Find the mass of the man on earth and planet
    (b) Find the acceleration due to gravity on the planet
    (i)
    (ii)

33. Is acceleration due to gravity (g) constant?. Tell us how it is there at different places on earth?

34. The pressure exerted by a cube of side 0.03m on a surface is 10Pa. Calculate the thrust exerted by the cube?

35. State the mathematical formula that relates thrust and pressure. List the factors on which the pressure depends and explain how it depends on them?

36. Differentiate between thrust and pressure?

37. The mass of a block made of certain material is 13.5 kg and its volume is $15 \times 10^{-3} m^3$. Will the block float or sink in water?

38. State Archimedes principle?

39. Define buoyancy. State the factors on which buoyant force depends?

40. Why does a body lose weight when immersed in a liquid?

41. State the conditions under which a body will sink or float in a fluid?

42. Explain why
    (a) Pressure on ground more when man is walking than he is standing?
    (b) A bucket of water is lighter when in water than when it is taken out of water?
    (c) An iron nail floats on mercury but sink in water
       (a)

(b)-

(c)-

43.   Differentiate between density and relative density

44.   A 100 cm^3 block has a mass of 395g. Find its relative density given density of water is 1000 kg/m^3

45.   Why are railway tracks laid on large sized concrete sleepers?

----

46. While drawing water from a well, the bucket of water appears to be heavier as it comes out of the water?

----

47. Why does a block of plastic releases underwater come up to the surface of water?

----

48. Two particles A and B of mass m^1 and m^2 respectively are placed at some distance. If the mass of each of the two particles is doubled, keeping the distance between them unchanged, the value of gravitational force between them will be
(a) 4 times   (b) 2 times   (c) 1/2 times   (d) 1/4 times

----

49. A boy is whirling a stone tied with a string in an horizontal circular path. If the string breaks, the stone
(a) will continue to move in the circular path
(b) will move along a straight line towards the centre of the circular path
(c) will move along a straight line tangential to the circular path
(d) will move along a straight line perpendicular to the circular path away from the boy

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50. An object weighs 20 N when measured on the surface of the earth. What would be its weight when measured on the surface of the moon?

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51. Earth Gravitational pull causes an acceleration 7m/s² in 2 kg of body somewhere in the space. How much will be the acceleration of 10 Kg mass due to earth gravitational pull at the same place

52. A child sitting along a swimming pool feels lighter while lowering his legs in water. Why?

53. A piece of iron weighs 44.5gf in air, 39.5 gf in water and 40.3 gf in an oil. Find:
    (a) the relative density of iron.
    (b) the density of oil in SI unit. What assumption have you made in your calculation? Given density of water=1 gm/cc = 1000 kg/cubic m

    (a)

    (b)

54. A solid weighs 200 gf in air, 160 gf in water and 170 gf in a liquid. Calculate the relative density of the solid and that of the liquid?

55. What do you understand by 1 Pascal and 1 Newton?

56. Define thrust. A force of 150N acts on a surface of area 15cm². Calculate thrust and pressure?

57. If a fresh egg is put into a beaker filled with water, it sinks. On dissolving a lot of salt in the water, the egg begins to rise and then floats. Why?

58. Define pressure? Give its mathematical expression and its SI unit?

59. In what direction does the buoyant force on an object immersed in a liquid act?

60. Differentiate between density and relative density?

61. How do snow shoes stop you from sinking into snow?

62. An ball is thrown vertically upwards and rises to a height of 10 m. Calculate
    (i) the velocity with which the object was thrown upwards
    (ii) the time taken by the object to reach the highest point.?

    (i)--

    (ii)---

    ----

63. Define relative density. Relative density of mercury is 13.6. The density of water is 1000 kg/m³. What is the density of mercury in SI unit?

64. You are provide with a hollow iron ball of volume 20cm³, mass of 15g and a solid iron ball of mass 20g. Both are placed on the surface of water contained in a large tub. What will float? Give reason for your answer? Given density of iron= 8 g/cc

65. The dining has dimensions 50m×15m×3.5m. Calculate the mass of air in the hall? (Density of air= 1.30kg/m³)?

66. The earth and the moon are attracted to each other by gravitational force. Does the earth attract the moon with a force that is greater or smaller or the same as the force with which the moon attracts the earth? Why?

67. Amit buys few grams of gold at the poles as per the instruction of one of his friends. He hands over the same when he meets him at the equator. Will the friend agree with the weight of gold bought? If not, why? [Hint: The value of g is greater at the poles than at the equator].

68. A ball is thrown vertically upwards with a velocity of 49 m/s. Calculate
    (i) the maximum height to which it rises.
    (ii) the total time it takes to return to the surface of the earth.

    (i)--

    (ii)---

    ----

69. How does the force of gravitation between two objects change when the distance between them is reduced to half?

    ----

70. What is the force of gravity between the earth and mass of 1 kg placed on its surface

    ----

    ----

71. The value of g on the surface of the earth is 9.8 m/s". What will be its value on the surface of entire moon?

    ----

72. A stone dropped from a tree takes 2 s to reach the ground. Find its velocity on striking the ground

    ----

    ----

73. Mass of a book is 500 g on surface of the earth. What will be its mass at a height equal to radius of earth?

74. What is meant by free fall? A ball is dropped from the roof of a building. It taakes 10 seconds to reach the ground. Find the height of the building. (g = 9.8 m/s?)

75. The earth attracts two objects A and B placed at same distance from its centre with same force. Prove that their masses are equal.

76. Mass of a planet is twice that of the earth and its radius is four times of the earth. Find thevalue of 'g on its surface

77. Find the force of gravitational attraction between the earth and a planet of mass M. $M_e = 6 \times 10^{24}$ kg, $M_n = 10^{22}$ kg, $R_{em} = 3.84 \times 10^8$ m

78. On the earth, a stone is thrown from a height in a direction parallel to the earth's surface while another stone is simultaneously dropped from the same height. Which stone would reach the ground first and why?

79. Suppose gravity of earth suddenly becomes zero, then in which direction will the moon begin to move if no other celestial body affects it?

80. Identical packets are dropped from two aeroplanes, one above the equator and the other above the north pole, both at height h. Assuming all conditions are identical, will those packets take same time to reach the surface of earth. Justify your answer.

Objective Questions

10.01 Two objects of different masses falling freely near the surface of moon would

    (a) have same velocities at any instant

    (b) have different accelerations

    (c) experience forces of same magnitude

    (d) undergo a change in their inertia

10.02 The value of acceleration due to gravity

    (a) is same on equator and poles

    (b) is least on poles

    (c) is least on equator

    (d) increases from pole to equator

10.03 The gravitational force between two objects is F. If masses of both objects are halved without changing distance between them, then the gravitational force would become

    (a) F/4

    (b) F/2

    (c) F

    (d) 2 F

10.04 A boy is whirling a stone tied with a string in an horizontal circular path. If the string breaks, the stone

    (a) will continue to move in the circular path

    (b) will move along a straight line towards the centre of the circular path

    (c) will move along a straight line tangential to the circular path

    (d) will move along a straight line perpendicular to the circular path away from the boy

10.05 An object is put one by one in three liquids having different densities. The object floats with $\frac{1}{9}$, $\frac{2}{11}$ and $\frac{3}{7}$ parts of their volumes outside the liquid surface in liquids of densities d1, d2 and d3 respectively. Which of the following statement is correct?

    (a) $d_1 > d_2 > d_3$

    (b) $d_1 > d_2 < d_3$

    (c) $d_1 < d_2 > d_3$

    (d) $d_1 < d_2 < d_3$

10.06 In the relation $F = GMm/d^2$, the quantity G

    (a) depends on the value of g at the place of observation

    (b) is used only when the earth is one of the two masses

    (c) is greatest at the surface of the earth

    (d) is universal constant of nature

10.07 Law of gravitation gives the gravitational force between

    (a) the earth and a point mass only

    (b) the earth and Sun only

    (c) any two bodies having some mass

    (d) two charged bodies only

10.08 The value of quantity G in the law of gravitation

    (a) depends on mass of earth only

    (b) depends on radius of earth only

    (c) depends on both mass and radius of earth

    (d) is independent of mass and radius of the earth

10.09 Two particles are placed at some distance. If the mass of each of the two particles is doubled, keeping the distance between them unchanged, the value of gravitational force between them will be

    (a) $\frac{1}{4}$ times

    (b) 4 times

    (c) $\frac{1}{2}$ times

    (d) unchanged

10.10 The atmosphere is held to the earth by

    (a) gravity

(b) wind

(c) clouds

(d) earth's magnetic field

10.11 The force of attraction between two unit point masses separated by a unit distance is called

(a) gravitational potential

(b) acceleration due to gravity

(c) gravitational field

(d) universal gravitational constant

10.12 The weight of an object at the centre of the earth of radius R is

(a) zero

(b) infinite

(c) R times the weight at the surface of the earth

(d) $1/R^2$ times the weight at surface of the earth

10.13 An object weighs 10 N in air. When immersed fully in water, it weighs only 8 N. The weight of the liquid displaced by the object will be

(a) 2 N

(b) 8 N

(c) 10 N

(d) 12 N

10.14 A girl stands on a box having 60 cm length, 40 cm breadth and 20 cm width in three ways. In which of the following cases, pressure exerted by the brick will be

(a) maximum when length and breadth form the base

(b) maximum when breadth and width form the base

(c) maximum when width and length form the base

(d) the same in all the above three cases

10.15 An apple falls from a tree because of gravitational attraction between the earth and apple. If F_1 is the magnitude of force exerted by the earth on the apple and F_2 is the magnitude of force exerted by apple on earth, then

(a) F_1 is very much greater than F_2

(b) F_2 is very much greater than F_1

(c) F_1 is only a little greater than F_2

(d) F_1 and F_2 are equal

CHAPTER 11 WORK AND ENERGY

1. What is unit of energy?

    ----

2. The total energy when a body falls freely towards earth remains constant. True or false?

    ----

3. What do you mean by kinetic energy of the body?

    ----

4. If the mass of the body is doubled and velocity is made halved, the kinetic energy will become?

    ----

5. Potential energy is a vector quantity True or false?

    ----

6. When the force acts at right angle to the direction of motion, what is the work done by the force?

    ----

7. What is Power?

    ----

8. What is Law of conservation of energy?

Fill in the blanks

9. 1 Kilo Watt hour of energy is equal to _____ Joule

10. Power is the rate of doing _____. And its unit is _____

11. Work done by the force can be _____ and _____.

12. The water stored in the reservoir of the tank possessed _____ energy

13. The total energy of the swinging pendulum remains _____ at all the points

14. When the body falls freely towards earth ,potential energy of the body _____ while kinetic energy of the body_____. The total remains _____ at all the point during the motion

15. An electric bulb of 100 W is used for 8 h per day. Calculate the 'units' of energy consumed in one day by the bulb?

16. An engineer is asked to design a playground slide such that the speed a child reaches at the bottom does not exceed 4.0 m/s. Determine the maximum height that the slide can be.?Given, g = 9.8 m/s^2.

17. Which one of the following is not the unit of energy?
(a) joule   (b) newton metre   (c) kilowatt   (d) kilowatt hour

18. A rocket is moving up with a velocity v. If the velocity of this rocket is suddenly tripled, what will be the ratio of two kinetic energies?

19. A force of 10 N displaces a body by a distance of 3 m at an angle 60° to its own direction. Find the amount of work done

20. What do you understand by transformation of energy? Explain with the help of suitable example?

21. List two essential conditions for work to be done?

22. Define energy?

23. Define work? Write an expression of work in terms of force and displacement. State SI unit of work done?

24. Compare the kinetic energies of two objects of masses 10kg anf 50kg respectively but having same momentum?

25. What is a work done on a body moving in a circular path?

26. Identify the state the type of energy transformation in the following cases:

(a) Riding a bicycle
(b) Burning of cracker

(a)

(b)

27. Define potential energy? Write an expression for potential energy. Write the SI unit of potential energy?

28. What is work done by the force of gravity on a satellite moving round the earth? Justify the answer?

29. Define kinetic energy? Write an expression for kinetic energy? Write the SI unit of kinetic energy?

30. Define 1 Watt of power? A lamp consumes 1000J of electrical energy in 10s. Calculate its power?

31. Name the two types of mechanical energy? Give two examples when an object possesses both types of energies?

32. Calculate the amount of work required to stop a car of 1000kg moving with a speed of 72km/h?

33. Does the gravitational potential energy of a body depend on the path along which the body is moved, while going from one point to another? Illustrate your answer with the help of suitable example?

34. An object thrown at a certain angle to the ground moves in a curved path and falls back to the ground. The initial and the final points of the path of the object lie on the same horizontal line? What is the work done by the force of gravity on the object?

35. Can a body have energy without momentum? Explain?

36. Calculate the kinetic energy of a car of mass 750kg moving with a velocity of 54km/. Find the new kinetic energy of a car if passenger of mass 50kg sit in the car?

37. Establish a relationship between momentum and kinetic energy of a body?

38. Calculate the kinetic energy of a car of mass 500kg moving with a velocity of 18Km/h. Find the new kinetic energy if two passengers of mass 50 kg each sit in the car?

39. Derive an expression for the kinetic energy of an object?

40. A light and a heavy object have the same momentum. Find out the ratio of their kinetic energies. Which one has a larger kinetic energy?

41. Define one joule of kinetic energy?

42. A ball of mass 2kg is thrown up with a speed of 10m/s. find the kinetic energy of the ball at the time of throwing. Also find the potential energy of the ball at the highest point?

43. An object of mass m and velocity v has kinetic energy= 200J. Find the new kinetic energy if the mass of the object becomes double and velocity still remains the same?

44. Calculate the kinetic energy of a car of mass 500kg moving with a velocity of 36km/h. Find the kinetic energy if the velocity of car doubles?

45. Calculate the power of an electric motor that can lift 800 kg of water to store in a tank at a height of 1500cm in 20s. (g=10m/s^2).

46. Calculate the electrical energy consumed in Joules if a toaster of 60 W is used for 30 minutes?

47. An electric heater of 1000 W is used for two hours in a day? What is the cost of using it for a month of 28 days, if one unit costs 3.00 rupees?

48. A lamp consumes 500 J of electrical energy in 20 sec. What is the power of the lamp?

49. In a factory four bulbs of 100 W each and five fans of 110 W each operate for 12 hours daily. Calculate the units of electricity consumed? Also find the total expenditure if one unit costs 2.50 rupees?

50. The work done in lifting a box on to a platform does not depend upon how fast it is lifted up. Explain your answer giving proper reason?

51. A geyser of 2.5kW is used for eight hours daily? Calculate the monthly consumption of electrical energy units. Also calculate the cost of electrical units consumption in a month if rate per unit is 3.50 rupees?

52. Two bodies of equal masses move with the uniform velocities v and 3v respectively. Find the ratio of their kinetic energy?

53. A boy stands on the edge of a cliff and throws a stone vertically downward with an initial speed of 10 m/s. The instant before the stone hits the ground below, it has 1000 J of kinetic energy. If he were to throw the stone horizontally outward from the cliff with the same initial speed of 10 m/s, how much kinetic energy would it have just before it hits the ground?

54. The kinetic energy of a car is 7000 J as it travels along a horizontal road. How much work is required to stop the car in 20 s?

55. The commercial unit of energy is :
(a) watt   (b) watt-hour   (c) kilowatt-hour   (d) kilowatt

56. In case of negative work, the angle between the force and displacement is :
(a) 0°   (b) 45°   (c) 90°   (d) 180°

57. A body does 20 joules of work in 5 seconds. What is its power ?

58. How much energy does a 100 W electric bulb transfer in 1 minute ?
(a) 100 J   (b) 600 J   (c) 3600 J   (d) 6000 J

59. A radio set of 60 watts runs for 50 hours. How many 'units' (kWh) of electrical energy are consumed?

60. How fast should a man of 50 kg run so that his kinetic energy be 625 J ?

61.   State whether the following objects possess kinetic energy, potential energy, or both
       (a) A man climbing a hill
       (b) A flying aeroplane
       (c) A bird running on the ground
       (d) A ceiling fan in the off position
       (e) A stretched spring lying on the ground.

       (a)--
       (b)--
       (c)--
       (d)--
       (e)--

62.   Two bodies A and B of equal masses are kept at heights of h and 2h respectively. What will be the ratio of their potential energies ?

63.   What is the kinetic energy of a body of mass 1 kg moving with a speed of 2 m/s ?

64.   Is potential energy a vector or a scalar quantity ?

65.   Fill in the following blanks with suitable words :

       (a) Work is measured as a product of .... and ....

(b) The work done on a body moving in a circular path is ....

(c) 1 joule is the work done when a force of one .... moves an object through a distance of one........... in the direction of ....

(d) The ability of a body to do work is called .... The ability of a body to do work because of its motion is called................

(e) The sum of the potential and kinetic energies of a body is called .... energy.

66. How much work is done by a force of 10 N in moving an object through a distance of 1 m in the direction of the force

67. Write the formula for work done on a body when the body moves at an angle to the direction of force. Give the meaning of each symbol used.

68. An electric bulb consumes 7.2 kJ of electrical energy in 2 minutes. What is the power of the electric bulb ?

69. A car weighing 1000 kg and travelling at 30 m/s stops at a distance of 50 m decelerating uniformly. What is the force exerted on it by the brakes ? What is the work done by the brakes ?

70. (a) What do you understand by the kinetic energy of a body ?
     (b) A body is thrown vertically upwards. Its velocity goes on decreasing. What happens to its kinetic energy as its velocity becomes zero ?
     (c) A horse and a dog are running with the same speed. If the weight of the horse is ten times that of the dog, what is the ratio of their kinetic energies ?

     (a)

     (b)

     (c)

71. Calculate the kinetic energy of a body of mass 2 kg moving with a velocity of 0.1 metre per second.

72. Two bodies of equal masses move with uniform velocities v and 3v respectively. Find the ratio of

their kinetic energies.

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73. On a level road, a scooterist applies brakes to slow down from a speed of 10 m/s to 5 m/s. If the mass of the scooterist and the scooter be 150 kg, calculate the work done by the brakes. (Neglect air resistance and friction)

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74. The device which converts mechanical energy into energy which runs our microwave oven is :
(a) electric motor   (b) alternator   (c) turbine   (d) electric heater

----

75. If acceleration due to gravity is 10 m/s^2, what will be the potential energy of a body of mass 1 kg kept at a height of 5 m ?

----

76. A bag of wheat weighs 200 kg. To what height should it be raised so that its potential energy may be 9800 joules? (g = 9.8 ms^{-2})

----

77. Describe the energy changes which take place in a radio.

78. Write the energy transformations which take place in an electric bulb (or electric lamp)

79. When a ball is thrown inside a moving bus, does its kinetic energy depend on the speed of the bus? Explain.

80. What should be the angle between the direction of force and the direction of motion of a body so that the work done is zero ?

Objective Questions

11.01 When a body falls freely towards the earth, then its total energy

(a) increases

(b) decreases

(c) remains constant

(d) first increases and then decreases

11.02 A car is accelerated on a levelled road and attains a velocity 4 times of its initial velocity. In this process the potential energy of the car

(a) does not change

(b) becomes twice to that of initial

(c) becomes 4 times that of initial

(d) becomes 16 times that of initial

11.03 In case of negative work the angle between the force and displacement is

(a) 0 0.

(b) 45 0.

(c) 90 0.

(d) 180 0

11.04 An iron sphere of mass 10 kg has the same diameter as an aluminium sphere of mass is 3.5 kg. Both spheres are dropped simultaneously from a tower. When they are 10 m above the ground, they have the same

(a) acceleration

(b) momenta

(c) potential energy

(d) kinetic energy

11.05 A girl is carrying a school bag of 3 kg mass on her back and moves 200 m on a levelled road. The work done against the gravitational force will be ($g = 10 ms^{-2}$)

(a) 6×10^3 J

(b) 6 J

(c) 0.6 J

(d) zero

11.06 Which one of the following is not the unit of energy?

(a) joule

(b) newton metre

(c) kilowatt

(d) kilowatt hour

11.07 The work done on an object does not depend upon the

(a) displacement

(b) force applied

(c) angle between force and displacement

(d) initial velocity of the object

11.08 Water stored in a dam possesses

(a) no energy

(b) electrical energy

(c) kinetic energy

(d) potential energy

11.09 A body is falling from a height h. After it has fallen a height h_2, it will possess

(a) only potential energy

(b) only kinetic energy

(c) half potential and half kinetic energy

(d) more kinetic and less potential energy

CHAPTER 12 — SOUND

1. Name two animals which can produce infrasonic waves.

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2. What is reverberation?

   ----

3. What is echo?

   ----

4. What is infrasonic? Give an example.

   ----

5. Give examples of organisms which can hear infrasonic?

   ----

6. What are infrasonic and ultrasonic sounds?

   ----

7. What is the audible range of human ear?

   ----

8. Why do we hear sound of an approaching truck before the truck reaches us?

   ----

9. What is the frequency of wave with time period 0.025 s?

10. A baby recognizes her mother by her voice. Name the characteristic of sound involved

11. What is SONAR? For what it is used?

12. An echo is returned in 6 seconds. What is the distance of reflecting surface? from source? [Given that speed of sound is 342 m/s.]

13. Why Ceiling of good conference halls and concert halls are curved?

14. A body is vibrating 12000 times in one minute. If the velocity of sound in air is 360 m/s, find:
(a) Frequency of vibration in hertz,
(b) Wavelength of the wave produced.

15. Why Sometimes we hear echo of sound.

16. What is a wave number?

17. Are Sound waves mechanical waves?

18. A vibrating body produces sound. However, no sound is heard when a simple pendulum oscillates in air why?

19. What type of waves can travel in vacuum? Give example(s).

20. A stone is dropped from a 50 m tall building into a pond. When is sound of splash heard at the top? (g=10m/s^2, speed of sound in air= 340m/s)?

21. Define one hertz?

22. Audible frequency range of a human ear is 20 hertz to 20000hertz. Express it in terms of time period?

23. Derive the relationship between wavelength, frequency and speed of sound?

24. Define wavelength?

25. Draw a graph showing density and pressure variations with respect to distance for a disturbance produced by sound wave? Mark the position of compression and rarefaction on this curve/graph. Name the regions of maximum and minimum change in pressure respectively?

26. Which characteristic of the sound helps you to identify your friend by his voice while sitting with others in a darkroom?

27. Explain with the help of bell jar experiment that sound cannot travel in vaccum?

28. What is a transverse wave?

29. A radar signal is received $2*10^{-5}$ sec. After it was sent and reflected by an aeroplane. How far is

the aeroplane if speed of waves is $3*10^8$ m/s?

----

30.   Give two practical applications of reflection of sound waves?

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31.   Briefly mention three uses of ultrasound in the field of medicine?

----

32.   Distinguish between transverse waves and longitudinal waves?

----

33.   How temperature affects the velocity of sound?

----

34.   Guess which sound has a higher pitch; guitar or car horn?

----

35.   When vertically upward jerk is given to a string, transverse waves are formed? Give three reasons?

----

36.   A tuning fork having frequency 312Hz emits a wave which has a wavelength of 1.10m. Calculate the speed of sound?

----

37. Which wave property determines pitch?

38. Why do we hear the sound produced by a humming bees while sound of vibrations of a simple pendulum is not heard?

39. A wave is moving in air with a velocity of 340m/s. Calculate the wavelength if its frequency is 512Hz?.

40. Find the distance of cloud from you when you hear a thunder 3 sec after the lightning is seen. (given the speed of light= $3*10^8$ m/s, speed of sound= 330m/s)? Why is lightning seen a few seconds before the thunder is heard during a thunderstorm?

41. Why do we hear more clearly in a room with curtains than in a room without curtains? Explain in brief?

42. Explain giving reason the purpose of using curved ceilings in cinema halls?

43. Write full form of acronym SONAR. How the method of echo-ranging is used to detetmine the depth of the sea?

44. Explain, how defects in a metal block can be detected using ultrasound?

45. How bats can detect their prey?

46. What is the frequency of a wave whose time period is 0.05s?

47. A ship is stationary is at a distance of 2800m from the sea-bed. The ship sends an ultrasound signal to the sea-bed and its echo is heard after 4s. Find the speed of sound in water?

48. A body is vibrating 6000times in one minute. If the velocity of sound in air is 360m/s, Find:
    (a) Frequency of the vibration in Hz
    (b) Wavelength of sound produced

    (a)

    (b)

49. Explain with the help of a diagram the working of SONAR?

50. A hospital uses an ultrasonic scanner to locate tumors in a tissue. What is the wavelength of ultrasound in a tissue in which the speed of ultrasound is 1.5km/sec² ? The operating frequency of the scanner is 4.0 MHz?

51. State any two characteristics of a wave motion?

52. A ship sends out ultrasound that returns from the sea-bed and is detected after 3.22sec. If the speed of ultrasound in sea water is 1530m/s, calculate the distance of the sea-bed from the ship?

53. How do the frequency and amplitudes affect musical sound?

54. Explain how the human ear works?

55. A person hears an echo from the top of a tower, 2.2 sec after the sound is produced. How far away is the tower from the person? Speed of the sound in air is 332m/s?

56. How can multiple echoes of a single sound be produced? Explain?

57. Define echo. Give its two application?

58. When a sound is reflected from a distant object, an echo is produced and heard on a winter night. Will you hear the echo of the same sound on a summer day if the distance between reflecting surface and the source of sound remains the same? Justify your answer?

59. Why are the walls and roof of an auditorium covered with sound absorbent materials?

60. Define reverberation. What arrangements should be made in an auditorium to control excessive reverberation?

61. Determine the minimum distance between the listener and reflector for an echo to be heard dintinctively of a sound propagating with a speed v m/s?

62. Name the tube which connects the middle ear to throat.

63. What type of scans are used these days to monitor the growth of developing baby in the uterus of the mother ?

64. Sound waves travel with a speed of about 435 m/s. What is the wavelength of sound whose frequency is 650 hertz ?

65. Name the nerve which carries electrical impulses from the cochlea of ear to the brain.

66. What is a stethoscope ? Name the principle on which a stethoscope works.

67. Fill in the following blanks with suitable words :
    (a) An echo is simply a .... sound.
    (b) Loudness of sound depends on ....
    (c) Pitch of sound depends on ....

68. If a thunder is heard by a man 9 seconds after the lightning is seen, how far is the lightning from

the man ? (Speed of sound in air = 790 m/s).

69.   A man claps his hands near a mountain and hears the echo after 7 seconds. If the speed of sound under these conditions be 330 m/s, calculate the distance of the mountain from the man.

70.   What is the name of passage in outer ear which carries sound waves to the ear-drum ?

71.   If the speed of a wave is 340 m/s and its frequency is 1700 Hz, then for this wave in cm will be :
(a) 2   (b) 0.2
(c) 20   (d) 200

72.   What is a soundboard ? Explain the working of a soundboard with the help of a labelled diagram.

73. We can distinguish between the musical sounds produced by different singers on the basis of the characteristic of sound called :
(a) frequency　　(b) timbre　　(c) loudness　　(d) pitch

74. How is an ultrasound scan for fetus (unborn baby) better than X-ray ?

75. A musical instrument is producing a continuous note. This note cannot be heard by a person having a normal hearing range. This note must then be passing through :
(a) water　　(b) wax　　(c) vacuum　　(d) empty vessel

76. Which one of the following does not consist of transverse waves ?
(a) light emitted by a CFL　　(b) TV signals from a satellite
(c) ripples on the surface of a pond　　(d) musical notes of an orchestra

77. Why should we not put a pin or pencil in our ears ?

78. An echo-sounder in a trawler (fishing boat) receives an echo from a shoal of fish 0.4 s after it was sent. If the speed of sound in water is 1500 m/s, how deep is the shoal ?
(a) 300 m　　(b) 150 m　　(c) 7500 m　　(d) 600 m

----

79. A sonar device attached to a ship sends ultrasonic waves in the sea. These waves are reflected from the bottom of the sea. If the ultrasonic waves take 2 seconds to travel from the ship to the bottom of the sea and back to the ship (in the form of an echo), what is the depth of the sea ? (Speed of sound in water = 4500 m/s).

----

80. What is a bulb horn ? Name the principle on which a bulb horn works.

----

81. Give reason for the following :
In most of the cases, we cannot see the vibrations of a sound producing object with our eyes.

----

82. Describe a simple experiment to show that the prongs of a sound producing tuning fork are vibrating.

----

83. When we open a gas tap for a few seconds, the sound of escaping gas is heard first but the smell of gas comes later. Why ?

84. (a) What is ultrasound ? What is the difference between ordinary sound and ultrasound ?
    (b) Write any three applications (or uses) of ultrasound.

    (a)

    (b)

Objective Questions

12.01 Note is a sound

  (a) of mixture of several frequencies

  (b) of mixture of two frequencies only

  (c) of a single frequency

  (d) always unpleasant to listen

12.02 A key of a mechanical piano struck gently and then struck again but much harder this time. In the second case

  (a) sound will be louder but pitch will not be different

  (b) sound will be louder and pitch will also be higher

  (c) sound will be louder but pitch will be lower

  (d) both loudness and pitch will remain unaffected

12.03 In SONAR, we use

  (a) ultrasonic waves

  (b) infrasonic waves

  (c) radio waves

  (d) audible sound waves

12.04 Sound travels in air if

  (a) particles of medium travel from one place to another

  (b) there is no moisture in the atmosphere

  (c) disturbance moves

  (d) both particles as well as disturbance travel from one place to another.

12.05 When we change feeble sound to loud sound we increase its

  (a) frequency

  (b) amplitude

  (c) velocity

  (d) wavelength

12.06 In the curve (Fig.12.1) half the wavelength is

Fig. 12.1

  (a) A B

  (b) B D

  (c) D E

  (d) A E

12.07 Earthquake produces which kind of sound before the main shock wave begins

  (a) ultrasound

  (b) infrasound

  (c) audible sound

  (d) none of the above

12.08 Infrasound can be heard by

  (a) dog

  (b) bat

  (c) rhinoceros

  (d) human beings

12.09 Before playing the orchestra in a musical concert, a sitarist tries to adjust the tension and pluck the string suitably. By doing so, he is adjusting

  (a) intensity of sound only

  (b) amplitude of sound only

  (c) frequency of the sitar string with the frequency of other musical instruments

  (d) loudness of sound

CHAPTER 15 — IMPROVEMENT IN FOOD RESOURCES

1. Define animal husbandry.

   ----

2. What is the advantage of green manure?

   ----

3. What is vermicompost?

   ----

4. For increasing production, what is common in poultry, fisheries and bee – keeping?

   ----

5. Name two protein containing Rabi crops.

   ----

6. What does the number 1 : 2 mean in intercropping?

7. What is meant by sustainable agriculture?

8. "Simply increasing grain production for storage in warehouses cannot solve the problem of malnutrition and hunger." Give reason.

9. Name two exotic or foreign and two local breeds of cows selected for long lactation period.

10. List two characteristics each of roughage and concentrate in relation to animal feed. Give one example of each.

11. What is pasturage and how is it related to honey production?

12. Define hybridization. List its any two advantages.

13. Write four methods of weed control.

14. Why Italian bee variety is commonly used for commercial honey production?

15. (a) Describe any two irrigation system adopted in India to supply water to agricultural lands.
    (b) Write two advantages of building check dams.

    (a)

(b)

16. What are the desirable agronomic characteristics for crop improvements?

17. Give two examples of shellfishes.

18. Name two desirable traits for variety improvement in poultry farming.

19. State one factor which affects the quality of honey produced.

20. What management practices are common in dairy and poultry farming?

21. 'Green revolution' and 'white revolution' indicate that our natural resources are getting used more intensively. What can be the harmful effects of these?

22. How is it possible to control weeds in crop fields without using chemicals? Explain.

23. What are macronutrients? Which physiological processes of plants are effectd by the deficiency of such nutrients?

24. Mention the three major activities involved in improving the crop yields.

25. How do Sunhemp or guar help in crop production management? How is it better than fertilizers?

26. Write three points of difference between manures and fertilizers.

27. Distinguish between intercropping and mixed cropping.

28. Compare the use of manures and fertilizers in maintaining the fertility of soil.

29. List the nutrients supplied by air, water and soil to the plants.

30. A farmer wants to store his agricultural produce. What factors should he check before storing? What controlling measures should he take?

31. "There has been a four times increase in the production of food grains from 1960 to 2004 with only 25% increase in the cultivatable land area". Mention the steps undertaken by famers to achieve this success.

32. Explain river lift system. Where is this system more applicable?

33. What are Xanthium, Parathenium and Cyperinees rothendus? How do they harm crop production?

34. Mention three practices in which cattle farming is beneficial to mankind.

35. State three major factors that are needed for good production of poultry birds.

36. What is composite fish culture system? State one merit and one demerit of such a system.

37. Differentiate between milch and draught animals. What do th following supply to dairy animals:
(i) Roughage (ii) Concentrates?

     (a)--

     (b)--

38. What are the types of food requirements of dairy animals?

39. Government was setting up a school in the village. In the panchayat, varun who had just complete his class X suggested that the children should be taught about different agricultural practices and use of modern technology in it. Sarpanch liked the idea and arranged for the same.
    (a) Children were taught that wheat cannot be grown in Kharif season. Why?
    (b) Mention the desirable agronomic character for cereals.
    (c) Do you think that Varun did the right thing by making the suggestion to sarpanch? Mention any two values for which he is worth admiration.

     (a)--

(b)

(c)

40.   Gopal who was studying in class IX, thought a lot about what can be done to make his village prosperous? He suggested village Panchayat to integrate farming with animal husbandry.

He took sarpanch to government agencies for loan to buy modern agricultureal equipments, providing safe storage space and buy cattles. He also made them agree to establish a bio- gas plant in the village.
(a) How do good animal husbandary practices benefit farmers?
(b) Write two advantages of having a bio – gas plant in the village.
(c) List any two qualities of Gopal that inspired him to work for the prosperity of the village.

(a)

(b)

(c)——

41. Sohanpur, a small village, where crops were dependent on rain. Villagers were at the mercy of monsoon. To prevent crop failure, they discussed the matter in the panchayat and wanted to do some heaven to appease rain Gods. But Rakesh who was studying in class IX, advised all of them to adopt measures for conserving water and stop crop failure.

   (a) if there is low rainfall in a village throughout the year, list at least two measures by which farmers can prevent crop failure in future.
   (b) List two traditional ways of conserving water for irrigation.
   (c) Write two values of Rakesh that have helped the villagers to sail through the difficult times.

   (a)——

   (b)——

   (c)——

42. How growing chick pea or moong bean can help in maintaining soil fertility? What is this practice called?

43. Describe the types of loss caused by inappropriate conditions of moisture and temperature prevailing during storage of grains.

44. Define crop rotation? How is it used to increase the yield of crops? Why is this process called environment friendly?

45. List any six factors for which variety improvement in crops is done.

_____

_____

_____

_____

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_____

_____

_____

46. Excessive use of fertilizers and chemical pesticides is harmful – justify the statement. How can this problem be solved?

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47. Describe briefly about the traits and their utilities important for a cereal crop in improvement of varieties.

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48. Give the term used for rearing and caring of animals livestock. Explain three major aspects of this practice.

_____

_____

_____

49. Explain the desirable traits obtained after cross – breeding indigenous and exotic breeds of poultry birds.

50. How do you differentiate between capture fishing, mariculture and aquaculture?

51. Define genetically modified crops. How are they made? Explain the significance of genetically modified crops with suitable example.

52. Define livestock.

53. State the meaning of Layers. Why limestone is added in their diet ? Name one other dietary requirement of poultry birds.

54. Define Animal husbandry. Why livestock production needs to be improved ?

55. Explain the ways by which crop-production can be increased.

56. Name two local and exotic breeds of bees used for commercial production of honey. List any three qualities for which foreign breed are adopted.

57. Mention the type of loss caused by inappropriate conditions of moisture and temperature prevailing during storage of grains.

58. Describe briefly about the traits and their utilities important for a cereal crop in improvement of varieties.

59. Differentiate between compost and vermi compost. Write any three points of difference.

60. Based on the kind of biological material used, list two kinds of manures. How are they prepared ?

61. A farmer found that Xanthium and Parthenium are also growing along with paddy in the field. What are such plants called ? How does the presence of these plants affect the crop yield ? List any 4 methods for controlling them.

62. State one point of difference between biofertilizers and fertilizers. Give one example of each. What is the advantage of using bio-fertilizers over fertilizers ?

63. Cross breeding programme is successfully done in poultry farming. Enlist some desirable traits for which, cross breeding is done in poultry birds.

Objective Questions

15.01 Which one is an oil yielding plant among the following?

(a) Lentil

(b) Sunflower

(c) Cauliflower

(d) Hibiscus

15.02 Which one is not a source of carbohydrate?

(a) Rice

(b) Millets

(c) Sorghum

(d) Gram

15.03 Find out the wrong statement from the following

(a) White revolution is meant for increase in milk production

(b) Blue revolution is meant for increase in fish production

(c) Increasing food production without compromising with environmental quality is called as sustainable agriculture

(d) None of the above

15.04 To solve the food problem of the country, which among the following is necessary?

(a) Increased production and storage of food grains

(b) Easy access of people to the food grain

(c) People should have money to purchase the grains

(d) All of the above

15.05 Find out the correct sentence

(i) Hybridisation means crossing between genetically dissimilar plants

(ii) Cross between two varieties is called as inter specific hybridisation

(iii) Introducing genes of desired character into a plant gives genetically modified crop

(iv) Cross between plants of two species is called as inter varietal hybridisation

(a) (i) and (iii)

(b) (ii) and (iv)

(c) (ii) and (iii)

(d) (iii) and (iv)

15.06 Weeds affect the crop plants by

(a) killing of plants in field before they grow

(b) dominating the plants to grow

(c) competing for various resources of crops (plants) causing low availability of nutrients

(d) all of the above.

15.07 Which one of the following species of honey bee is an Italian species?

(a) Apis dorsata

(b) Apis florae

(c) Apis cerana indica

(d) Apis mellifera

15.08 Find out the correct sentence about manure

(i) Manure contains large quantities of organic matter and small quantities of nutrients.

(ii) It increases the water holding capacity of sandy soil.

(iii) It helps in draining out of excess of water from clayey soil.

(iv) Its excessive use pollutes environment because it is made of animal excretory waste.

(a) (i) and (iii)

(b) (i) and (ii)

(c) (ii) and (iii)

(d) (iii) and (iv)

15.09 Cattle husbandry is done for the following purposes

(i) Milk Production

(ii) Agricultural work

(iii) Meat production

(iv) Egg production

(a) (i), (ii) and (iii)

(b) (ii), (iii) and (iv)

(c) (iii) and (iv)

(d) (i) and (iv)

15.10 Which of the following are Indian cattle?

(i) Bos indicus

(ii) Bos domestica

(iii) Bos bubalis

(iv) Bos vulgaris

(a) (i) and (iii)

(b) (i) and (ii)

(c) (ii) and (iii)

(d) (iii) and (iv)

15.11 Which of the following are exotic breeds?

(i) Brawn

(ii) Jersey

(iii) Brown Swiss

(iv) Jersey Swiss

(a) (i) and (iii)

(b) (ii) and (iii)

(c) (i) and (iv)

(d) (ii) and (iv)

15.12 Poultry farming is undertaken to raise following

(i) Egg production

(ii) Feather production

(iii) Chicken meat

(iv) Milk production

(a) (i) and (iii)

(b) (i) and (ii)

(c) (ii) and (iii)

(d) (iii) and (iv)

15.13 Poultry fowl are susceptible to the following pathogens

(a) Viruses

(b) Bacteria

(c) Fungi

(d) All of the above

15.14 Which one of the following fishes is a surface feeder?

(a) Rohus

(b) Mrigals

(c) Common carps

(d) Catlas

15.15 Animal husbandry is the scientific management of

(i) animal breeding

(ii) culture of animals

(iii) animal livestock

(iv) rearing of animals

(a) (i), (ii) and (iii)

(b) (ii), (iii) and (iv)

(c) (i), (ii) and (iv)

(d) (i), (iii) and (iv)

15.16 Which one of the following nutrients is not available in fertilizers?

(a) Nitrogen

(b) Phosphorus

(c) Iron

(d) Potassium

15.17 Preventive and control measures adopted for the storage of grains include

(a) strict cleaning

(b) proper disjoining

(c) fumigation

(d) all of the above