SELECTION

9

SCIENCE

ANBU NILAYAM
MADURAI - 625001

SELECTION

9

SCIENCE

NINETH STANDARD

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⑨ SCIENCE

UNIT - 1. Measurement

TEXT BOOK EXERCISES

I. Choose the correct answer.

1. Choose the correct one.

a) mm < cm < m < km b) mm > cm > m > km
c) km < m < cm < mm d) mm > m > cm > km **Ans : a) mm < cm < m < km**

2. Rulers, measuring tapes and metre scales are used to measure

a) mass b) weight c) time d) length **Ans : d) length**

3. 1 metric ton is equal to

a) 100 quintals b) 10 quintals c) 1 / 10 quintals d) 1 / 100 quintals
Ans : b) 10 quintals

4. Which among the following is not a device to measure mass?

a) Spring balance b) Beam balance
c) Physical balance d) Digital balance **Ans : a) Spring balance**

II. Fill in the blanks.

1. Metre is the unit of ..... . **Ans : length**
2. 1 kg of rice is weighed by ..... . **Ans : Common Beam balance**
3. Thickness of a cricket ball is measured by ..... . **Ans : Vernier caliper**
4. Radius of a thin wire is measured by ..... . **Ans : Screw gauge**
5. A physical balance measures small differences in mass up to ..... .
Ans : 10 milligram

III. State whether true or false. If false, correct the statement :

1. The SI unit of electric current is kilogram. **Ans : False**
Correct statement : The SI unit of electric current is **ampere**.
2. Kilometre is one of the SI units of measurement. **Ans : False**
Correct statement : Metre is one of the SI units of measurement.
3. In everyday life, we use the term weight instead of mass. **Ans : True**
4. A physical balance is more sensitive than a beam balance. **Ans : True**
5. One Celsius degree is an interval of 1 K and zero degree Celsius is 273.15K.
Ans : True
6. With the help of vernier caliper we can have an accuracy of 0.1 mm and with screw gauge we can have an accuracy of 0.01 mm. **Ans : True**

IV. Match the following.

1.

1)	Length	a)	Kelvin
2)	Mass	b)	metre
3)	Time	c)	kilogram
4)	Temperature	d)	second

Ans :

1)	**Length**	**b)**	**metre**
2)	**Mass**	**c)**	**kilogram**
3)	**Time**	**d)**	**second**
4)	**Temperature**	**a)**	**Kelvin**

2.

1)	Screw gauge	a)	Vegetables
2)	Vernier caliper	b)	Coins
3)	Beam balance	c)	Gold ornaments
4)	Digital balance	d)	Cricket ball

Ans :

1)	**Screw gauge**	**b)**	**Coins**
2)	**Vernier caliper**	**d)**	**Cricket ball**
3)	**Beam balance**	**a)**	**Vegetables**
4)	**Digital balance**	**c)**	**Gold ornaments**

V. Assertion and reason type Questions.
Mark the correct answer as :

1. **Assertion (A) :** The scientifically correct expression is "The mass of the bag is 10kg".
Reason (R): In everyday life, we use the term weight instead of mass.
(a) Both A and R are true but R is not the correct reason.
(b) Both A and R are true and R is the correct reason.
(c) A is true but R is false. (d) A is false but R is true.
Ans : (b) Both A and R are true and R is the correct reason.

2. **Assertion (A) :** $0^{\circ}C$ = 273.16K. For our convenience we take it as 273K after rounding off the decimal.
Reason (R) : To convert a temperature on the Celsius scale we have to add 273 to the given temperature.
(a) Both A and R are true but R is not the correct reason.
(b) Both A and R are true and R is the correct reason.
(c) A is true but R is false. (d) A is false but R is true.
Ans : (b) Both A and R are true and R is the correct reason.

3. **Assertion (A) :** Distance between two celestial bodies is measured in terms of light year.
Reason (R) : The distance travelled by the light in one year is one light year.
(a) Both A and R are true but R is not the correct reason.
(b) Both A and R are true and R is the correct reason.
(c) A is true but R is false. (d) A is false but R is true.
Ans : (b) Both A and R are true and R is the correct reason.

VI. Answer very briefly.

1. Define measurement.
Ans : Measurement is defined as the determination of the size or magnitude of a quantity.

2. Define standard unit.
Ans : SI System of units is the modernised and improved form of the previous system of units.

3. What is the full form of SI system ?
Ans : International system of units.

4. Define least count of any device.
Ans : The smallest length which can be measured by metre scale is called least count.

5. What do you know about pitch of screw gauge ?
Ans : Pitch of the Screw gauge : Pitch of the screw is the distance moved by the tip of the screw for one complete rotation of the head.

6. Can you find the diameter of a thin wire of length 2m using the ruler from your instrument box ?
Ans : ✶ No, a ruler cannot measure diameter it can only measure length.
✶ The diameter of a thin wire can be measured using a screw gauge.

VII. Answer briefly.
1. Write the rules that are followed in writing the symbols of units in SI system.
Ans : 1. The units named after scientists are not written with a capital initial letter.
E.g. newton, henry, ampere and watt.
2. The symbols of the units named after scientists should be written by the initial capital letter.
E.g. **N** for newton, **H** for henry, **A** for ampere and **W** for watt.
3. Small letters are used as symbols for units not derived from a proper noun.
E.g. **m** for metre, **kg** for kilogram.
4. The symbols of the units are not expressed in plural form.
E.g. **10kg** not as **10 kgs.**

2. Write the need of a standard unit.
Ans : ✶ Earlier , different unit systems were used by people from different countries. So there is a necessity to use worldwide system of measurement.
★ Hence, SI (International System of Units) system of units was developed and recommended by General Conference on Weights and Measures at Paris in 1960 for international usage.

3. Differentiate mass and weight.
Ans :

S.No.	Mass	Weight
1.	It is a fundamental quantity.	It is a derived quantity.
2.	It has magnitude alone - scalar quantity.	It has magnitude and direction - vector quantity.
3.	It is the amount of matter contained in a body.	It is the normal force exerted by the surface on the object against gravitational pull.
4.	Remains the same everywhere.	Varies from place to place.
5.	It is measured using physical balance.	It is measured using spring balance.
6.	Its unit is kilogram.	Its unit is newton.

4. How will you measure the least count of vernier caliper ?
Ans : Least count of a vernier caliper

$$LC = \frac{\text{Value of one smallest main scale division}}{\text{Total number of vernier scale division}}$$

VIII. Answer in detail.

1. Explain a method to find the thickness of a hollow tea cup.

Ans :

- ✶ The thickness of a hollow tea cup can be determined by using a screw gauge.
- ✶ Determine the pitch, the least count and the zero error of the screw gauge.
- ✶ Place the hollow tea cup between the measuring faces.
- ✶ Rotate the head until the cup is held firmly but not tightly, with the help of the ratchat.
- ✶ Note the reading of the pitch scale crossed by the head scale (PSR) and the head scale division that coincides with the pitch scale axis (HSC).
- ✶ The thickness of the cup is given by PSR + CHSR (Corrected HSR). Repeat the experiment for different positions of the cup.
- ✶ Tabulate the readings.
- ✶ The average of the last column readings gives the thickness of a hollow tea cup.

S.No.	PSR (mm)	HSC (division)	CHSC = HSC ± ZC (division)	CHSR = CHSC x LC (mm)	Total Reading = PSR + CHSR(mm)
1.					
2.					
3.					
				Mean =	_____ mm

∴ The thickness of a hollow tea cup = _____mm

2. How will you find the thickness of a one rupee coin ?

Ans :

- ✶ The thickness of a one rupee coin can be determined by using a screw gauge.
- ✶ Determine the pitch, the least count and the zero error of the screw gauge.
- ✶ Place the coin between the measuring faces.
- ✶ Rotate the head until the coin is held firmly but not tightly, with the help of the ratchat.
- ✶ Note the reading of the pitch scale crossed by the head scale (PSR) and the head scale division that coincides with the pitch scale axis (HSC).
- ✶ The thickness of the coin is given by PSR + CHSR (Corrected HSR). Repeat the experiment for different positions of the coin.
- ✶ Tabulate the readings.
- ✶ The average of the last column readings gives the thickness of a one rupee coin.

S.No.	PSR (mm)	HSC (division)	CHSC = HSC ± ZC (division)	CHSR = CHSC x LC (mm)	Total Reading = PSR + CHSR(mm)
1.					
2.					
3.					
				Mean =	_____ mm

∴ The thickness of a one rupee coin = _____mm

IX. Numerical problems.

1. Inian and Ezhilan argue about the light year. Inian tells that it is 9.46×10^{15} m and Ezhilan argues that it is 9.46×10^{12} km. Who is right ? Justify your answer.

Solution : Inian statement is right.

Light travels 3×10^{8} m in one second

The total number of seconds is one year = $365 \times 24 \times 60 \times 60$
$= 3.153 \times 10^{7}$ second
1 light year $= 3.153 \times 10^{7} \times 3 \times 10^{8}$
$= 9.46 \times 10^{15}$ m

2. The main scale reading while measuring the thickness of a rubber ball using Vernier caliper is 7cm and the Vernier scale coincidence is 6. Find the radius of the ball.

Solution :
MSR = 7cm = 70 mm
Coincidence (VC) = 6
Radius = ?
Thickness (Diameter of the ball) = MSR + (VC x LC) - Z.E
$= 70 + (6 \times 0.1) - 0$
$= 70 + 0.6 = 70.6$ mm

$$\text{Radius of the ball} = \frac{\text{Thickness}}{2} = \frac{70.6}{2} = 35.3 \text{ mm}$$

∴ The radius of the ball = 35.3mm

3. Find the thickness of a five rupee coin with the screw gauge, if the Pitch scale reading is 1 mm and its head scale coincidence is 68.

Solution :
Pitch Scale Reading (PSR) = 1mm
Head Scale Coincidence (HSC) = 68
Thickness of the coin = PSR + CHSR
Corrected HSC (CHSC) = HSC ± ZC
Z.E = 0 ; ZC = 0
CHSC = 68 + 0 = 68
CHSR = CHSC x LC
LC = 0.01mm
CHSR = 68 x 0.01 = 0.68mm

∴ Thickness of the coin = 1 + 0.68 = 1.68 mm

4. Find the mass of an object weighing 98N.

Solution : Weight of an object = 98N
Acceleration due to gravity $g = 9.8 ms^{-2}$
$w = mg$

$$\text{Mass of an object } m = \frac{w}{g}$$

$$m = \frac{98}{9.8} = \frac{1}{0.1} = \frac{10}{1} = 10 \text{kg}$$

∴ Mass of an object m = 10kg

Additional Questions and Answers

Part - I.

Choose the best answer : (One Mark)

1. SI unit of Luminour intensity ..... .

a) ampere b) kelvin c) candela d) mole **Ans : c) candela**

2. If a man has a mass 50 kg on the earth, then what is his weight ?
a) 800 newton b) 600 newton c) 590 newton d) 490 newton
Ans : d) 490 newton

3. 1 par sec = ... light year.
a) 3.36 b) 3.46 c) 3.26 d) 3.56 **Ans : c) 3.26**

4. 1 millennium = ...s.
a) $3.16x10^{9}$ b) $3.16x10^{10}$ c) $3.16x10^{11}$ d) $3.16x10^{12}$ **Ans : a) $3.16x10^{9}$**

5. Acceleration due to gravity on the Moon is .....m/s ^{2}.
a)1.62 b) 1.64 c) 1.65 d) 1.63 **Ans : d) 1.63**

Part - II.
Answer very briefly (Two Marks)

1. a. ..... is the unit of distance used to measure astronomical objects outside the solar system.
b. The value for 1 AU (Astronomical Unit) is ..... .
Ans : a) Parsec b) $1.496x10^{11}$m

2. a. 1 Metric tonne is equal to .....kg.
b. Larger unit for measuring time is ..... .
Ans : a) 1000 b) millennium

---

3. Understand the assertion statement and the reason given and choose the correct choice.
Assertion (A) : Vernier Caliper is used to measure the inner and outer diameters of objects.
Reason (R) : It works on the principle of Hooke's law.
a) (A) is true, (R) is the correct reason b) (A) is true, (R) is not the correct reason
c) Both (A) and (R) is false. d) Both (A) and (R) is true
Ans : b) (A) is true, (R) is not the correct reason

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4. Correct the following statements :
a) Celsius is the SI unit of temperature.
Ans : False.
Correct statement : Kelvin is the SI unit of temperature.
b) 0^{o}C is commonly known as absolute zero.
Ans : False.
Correct statement : 0 K is commonly known as absolute zero.

---

5. Define Atomic mass unit.
Ans : Atomic mass unit :
Mass of a proton, neutron and electron can be determined using atomic mass unit (amu).
1 amu = $(1/12)^{th}$ of the mass of C^{12} atom.

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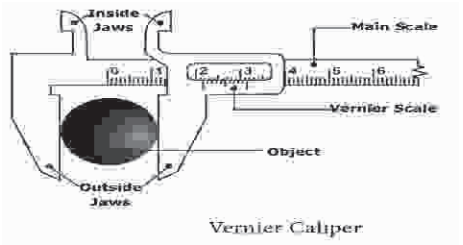
6. Draw and mark the parts of Vernier Caliper.
Ans :



Vernier Caliper

UNIT - 4. Electric charge and Electric current

TEXT BOOK EXERCISES

I. Choose the correct answer

1. In current electricity, a positive charge refers to,
a) presence of electron b) presence of proton
c) absence of electron d) absence of proton
Ans : c) absence of electron

2. Rubbing of comb with hair
a) creates electric charge b) transfers electric charge
c) either (a) or (b) d) neither (a) nor (b)
Ans :b) transfers electric charge

3. Electric field lines..... from positive charge and..... in negative charge.
a) start; start b) start; end
c) start: end d) end; end **Ans : b) start; end**

4. Potential near a charge is the measure of its ..... to bring a positive charge at that point.
a) force b) ability
c) tendency d) work **Ans : d) work**

5. Heating effect of current is called,
a) Joule heating b) Coulomb heating
c) voltage heating d) Ampere heating **Ans : a) Joule heating**

6. In an electrolyte the current is due to the flow of,
a) electrons b) positive ions
c) both (a) and (b) d) neither (a) nor (b) **Ans : c) both (a) and (b)**

7. Electroplating is an example for
a) heating effect b) chemical effect
c) flowing effect d) magnetic effect **Ans : b) chemical effect**

8. Resistance of a wire depends on,
a) temperature b) geometry
c) nature of material d) all the above **Ans : d) all the above**

II. Match the following

1.	Electric Charge	(a)	ohm
2.	Potential difference	(b)	ampere
3.	Electric field	(c)	coulomb
4.	Resistance	(d)	newton per coulomb
5.	Electric current	(e)	volt

Ans :

1.	**Electric Charge**	**(c)**	**coulomb**
2.	**Potential difference**	**(e)**	**volt**
3.	**Electric field**	**(d)**	**newton per coulomb**
4.	**Resistance**	**(a)**	**ohm**
5.	**Electric current**	**(b)**	**ampere**

III. State whether True or False. If false correct the statement.

1. Electrically neutral means it is either zero or equal positive and negative charges. **Ans : True**
2. Ammeter is connected in parallel in any electric circuit. **Ans : False**
Correct statement : Ammeter is connected in **series** in any electric circuit.
3. The anode in electrolyte is negative. **Ans : False**
Correct statement : The anode in electrolyte is **positive**.
4. Current can produce magnetic field. **Ans : True**

IV. Fill in the blanks.

1. Electrons move from..... potential to .....potential. **Ans :higher, lower**
2. The direction opposite to the movement of electron is called..... current. **Ans :Conventional**
3. The e.m.f of a cell is analogues to ..... of a pipe line. **Ans : Pump**
4. The domestic electricity in India is an ac with a frequency of ..... Hz. **Ans : 50**

V. Conceptual questions.

1. A bird sitting on a high power electric line is still safe. How?

Ans : ✶ Always current flows in a closed circuit. A bird sitting on a wire does not complete the circuit.

✶ The resistance of the bird's body is much higher than that of the line, so the bird might not experience high current.

✶ The potential difference between the two legs of the bird is same. The current flows on and the bird is safe.

✶ Because, the resistance of the wire is so low, nearly all of the current will go through the wire.

---

2. Does a solar cell always maintain the potential across its terminals constant? Discuss.

Ans : ✶ Solar cell voltage does not remain constant just as long as. There is sufficient irradiance light from dull to bright sunlight, because solar cell works on the principle of photo voltaic effect.

✶ It is a form of photoelectric cell, defined as a device whose electrical characteristics, such as current, voltage or resistance, very when exposed to light.

---

3. Can electroplating be possible with alternating current?

Ans : ✶ No, electroplating is process of continue flow of ions, which is not possible in alternating current.

✶ So the continue deposition of cation not occurs.

VI. Answer the following.

1. On what factors does the electrostatic force between two charges depend?

Ans :
1. value of charges on them,
2. distance between them and
3. nature of medium between them.

---

2. What are electric lines of force?

Ans :

✶ The lines representing the electric field are called 'electric lines of force'.

✶ The electric lines of force are straight or curved paths along which a unit positive charge tends to move in the electric field.

---

3. Define electric field.

Ans : The region in which a charge experiences electric force forms the 'electric filed' around the charge.

---

4. Define electric current and give its unit.

Ans :

✶ Current is the rate at which charges flow past a point on a circuit.

✶ The standard SI unit for current is ampere with the symbol A.

---

5. State Ohm's law.
Ans :
✶ Ohm's law states that electric potential difference across two points in an electrical circuit is directly proportional to the current passing through it.
V is the potential difference
I is the current V I ; V=IR
V=IR
R is the proportionality constant (or) Resistance

6.Name any two appliances which work under the principle of heating effect of current.
Ans : 1. Iron box 2. Water heater

---

7. How are the home appliances connected in general, in series or parallel. Give reasons.
Ans : Home appliances are connected in parallel
Reasons :
✶ The parallel circuit divided the current through the appliances.
✶ Each appliances will get the proper current depending on its resistance.
✶ Each of them can be put on / off independently.

---

8. List the safety features while handling electricity.
Ans : (i) Ground connection (ii) Trip switch (iii) Fuse

VII. Exercises
1. Rubbing a comb on hair makes the comb get - 0.4C. (a) Find which material has lost electron and which one gained it. (b) Find how many electrons are transferred in this process.
Solution : (a) Hair has lost the electron. The comb has gained the electron.
(b) The charge received by comb q = -0.4 C.
electric charge q - ne
n - number of electrons in 1 coulomb
e - charge on 1 electron $= 1.6 \times 10^{-19}$ C

$$q = ne$$

$$n = q/e$$

$$= \frac{-0.4\,C}{1.6 \times 10^{-19}\,C} \; ; \; -0.25 \times 10^{19} = 2.5 \times 10^{18} \text{ electrons}$$

So, 2.5×10^{18} electrons are transferred in this process.

---

2. Calculate the amount of charge that would flow in 2 hours through an element of an electric bulb drawing a current of 2.5A
Solution : Time 't' = 2 hours
= 2x60x60 = 7200 s
Current 'I' = 2.5A
The amount of charge, q = ?
I = q/t ; q = I X t = 2.5x7200 = 18,000
Amount of charge q = 18000C

---

3. The values of current (I) flowing through a resistor for various potential differences V across the resistor are given below. What is the value of resistor?

I (ampere)	0.5	1.0	2.0	3.0	4.0
V (volt)	1.6	3.4	6.7	10.2	13.2

[Hint: plot V-I a graph and take slope]

Solution : The slope of the line gives the value of resistance (R),

$$\text{Slope} = \frac{AC}{BC}$$

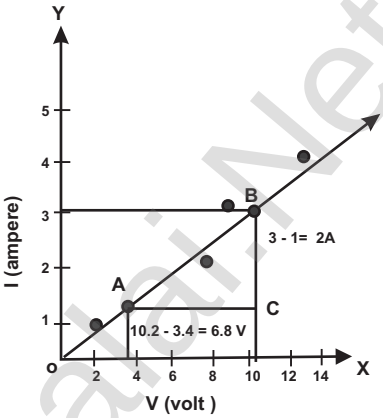
$$= \frac{6.8}{2} = 3.4$$

∴ The resistance across the resistor is 3.4 .

From ohm's law, V = IR

$$R = \frac{V}{I}$$

$$R = \frac{6.8}{2} = 3.4$$



Additional Questions

Part - I.

Choose the best answer.(One Mark)

1. The amount of charge on 1 electron is ..... .
(a) 6.25×10^{18}C (b) 1.6×10^{-19}C (c) 6.25×10^{-19}C (d) 1.6×10^{-18}C
Ans: (b) 1.6×10^{-19}C

2. ..... is an instrument used to measure the electric current.
(a) Voltmeter (b) Ammeter (c) Ohm meter (d) Galvanometer
Ans: (b) Ammeter

3. The formula of electromotive force is ..... .
(a) = w/q (b) = q/t (c) = V/I (d) none of these
Ans: (a) = w/q

4. Electric charge is measured in ..... .
(a) joule (b) volt (c) ampere (d) coulomb **Ans: (d) coulomb**

5. The SI unit of resistance is ..... .
(a) ampere (b) joule (c) ohm (d) volt **Ans: (c) ohm**

6. ..... is a good conductor of electricity.
(a) copper (b) glass (c) polymer (d) plastic **Ans: (a) copper**

7. ..... is a insulator.
(a) glass (b) copper (c) aluminium (d) iron **Ans:(a) glass**

8. The standard SI unit for current is ..... .
(a) ampere (b) volt (c) coulomb (d) joule **Ans: (a) ampere**

9. The SI unit for both e.m.f. and potential difference is the same in ..... .
(a) ohm (b) coulomb (c) volt (d) joule **Ans: (c) volt**

10. ..... is a electronic device which works on direct current (dc).
(a) Television (b) Electric fan (c) Cell phone (d) Micro wave
Ans:(c) Cell phone

UNIT - 7. Heat

TEXT BOOK EXERCISES

I. Choose the correct answer.

1.Calorie is the unit of
a) heat b) work c) temperature d) food **Ans : a) heat**

2.SI unit of temperature is
a) fahrenheit b) joule c) celsius d) kelvin **Ans : d) Kelvin**

3. Two cylindrical rods of same length have the area of cross section in the ratio 2:1. If both the rods are made up of same material, which of them conduct heat faster?
a) Both rods b) Rod-2 c) Rod-1 d) None of them **Ans : b) Rod - 2**

4.In which mode of transfer of heat, molecules pass on heat energy to neighbouring molecules without actually moving from their positions?
a) Radiation b) Conduction c) Convection d) Both B and C
Ans : b) Conduction

5.A device in which the loss of heat due to conduction, convection and radiation is minimized is
a) solar cell b) solar cooker c) thermometer d) thermos flask
Ans : d) thermos flask

II. Fill in the blanks.

1. The fastest mode of heat transfer is ..... . **Ans : radiation**
2. During day time, air blows from ..... to ..... . **Ans :sea to land**
3. Liquids and gases are generally ..... conductors of heat. **Ans : bad**
4. The fixed temperature at which matter changes state from solid to liquid is called ..... . **Ans: melting point**

III. Assertion and reason type questions.

Mark the correct choice as:

1. **Assertion:** Food can be cooked faster in vessels with copper bottom.
Reason: Copper is the best conductor of heat.
a. If both assertion and reason are true and reason is the correct explanation of assertion.
b. If both assertion and reason are true but reason is not the correct explanation of assertion.
c. If assertion is true but reason is false.
d. If assertion is false but reason is true.
Ans : a. If both assertion and reason are true and reason is the correct explanation of assertion.

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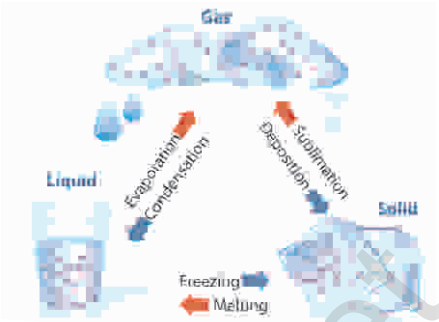
2. **Assertion**: Maximum sunlight reaches earth's surface during the noon time.
Reason : Heat from the sun reaches earth's surface by radiation.
a. If both assertion and reason are true and reason is the correct explanation of assertion.
b. If both assertion and reason are true but reason is not the correct explanation of assertion.
c. If assertion is true but reason is false.

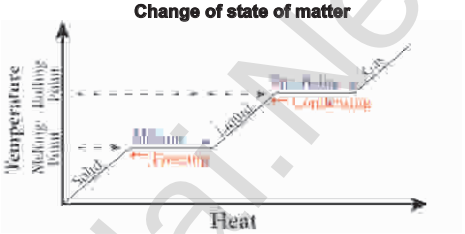
✶ The temperature at which a solid changes its state to liquid is called melting point. The reverse of melting is freezing. The process in which a liquid is converted to solid by releasing heat is called freezing. The temperature at which a liquid changes its state to solid is called freezing point. In the case of water, melting and boiling occur at 0°C.

Boiling-Condensation :

✶ The process in which a liquid is converted to vapor by absorbing heat is called boiling or vaporization. The temperature at which a liquid changes its state to gas is called boiling point. The process in which a vapor is converted to liquid by releasing heat is called condensation. The temperature at which vapour changes its state to liquid is called condensation point. Boiling point as well as condensation point of water is 100°C.



Change of state of matter



Various stages of conversion of state of matter

Sublimation:

✶ Some solids like dry ice, iodine, frozen carbon dioxide and naphthalene balls change directly from solid state to gaseous state without becoming liquid. The process in which a solid is converted to gaseous state is called sublimation.

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3. How can you experimentally prove water is a bad conductor of heat? How is it possible to heat water easily while cooking?

Ans :

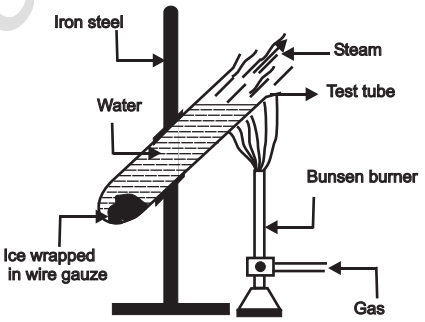
Experiment to prove that water is a bad conductor of heat :

✶ Take a hard glass test tube and drop in it a tiny cube of ice, wrapped in wire gauze. Fill 3/4 of the test tube with ice cold water and then set up the apparatus as shown in the diagram. Heat the test tube near its mouth.

✶ The water soon begins to boil at the top but the ice below has still not fully melted.

✶ This experiment shows that water is poor conductor of heat.

Aluminium is used for heating water quickly while cooking.



VI. Numerical Problems.

1. What is the heat in joules required to raise the temperature of 25 grams of water from 0ºC to 100ºC? What is the heat in Calories? (Ans : 10450 J)
(Specific heat of water = 4.18 J/gºC)

Solution : Mass of water (m) = 25 grams

Change in temperature (T) = 100°C - 0°C =100°C

Specific heat capacity of water (c) = 4.18 J/g°c

Heat (Q) = mc T; = 25X4.18X100 = 10450J

Heat in calories 1 joule = 0.238846 calories

10450 J = 10450 x 0.238846

= 2495.94 calories

---

2. What could be the final temperature of a mixture of 100 g of water at 90°C and 600g of water at 20°C. (Ans : 30° C)

Solution :

After mixing the water the total 700g will an equilibrium temperature T

The water at 90°c will lose an amount of heat (Q) = Cx100X (90°C - T)

This same amount of heat will be absorbed by the water at 20°c to raise its temperature

$$(Q) = CX600\,(T-20°C)$$

$$\text{Heat lost} = \text{Heat gained}$$

$$\cancel{C}X100((90°C-T) = \cancel{C}X600\,(T-20°C)$$

$$90°C-T = \frac{600\cancel{0}}{100\cancel{0}}\,(T-20°C)$$

$$90°C-T = 6\,(T-20°C)$$

$$90°C-T = 6T-120°C$$

$$90°C+120°C = 6T+T$$

$$210°C = 7T$$

$$7T = \frac{210°C}{7} = 30°C$$

$$\mathbf{T = 30°C}$$

---

3. How much heat energy is required to change 2 kg of ice at 0°C into water at 20°C? (Specific latent heat of fusion of water = 3,34,000J/kg, Specific heat capacity of water = 4200JKg^{-1}K^{-1}). (Ans : 8,36,000 J)

Solution:

Mass of ice at 0°c = 2 kg

Specific latent heat of fusion of water (L) = 334000J/kg

Mass of water at 20°c(M) = 2 kg

Specific heat capacity of water (C) = 4200JKg^{-1}K^{-1}

Change in temperature (T) = 20°C - 0°C = 20°C

Heat energy (Q) = mL + MC T

= (2X334000)+(2x4200x20)

= 668000+168000

Q = 836000J

Additional Questions and Answers

Part - I.

Choose the correct answer. (One Mark)

1. The solid, liquid, gaseous phases of water can coexist in equilibrium at ..... .

(a)273.16 K (b) 373.16 K (c) 173.16 K (d) 73.16 K

Ans :(a) 273.16 K

2. The SI Unit of specific heat capacity is ..... .

(a)JKg^{-1} (b) JKg^{-2}K^{-1} (c) JKg^{-2}K^{-2} (d) JKg^{-1}K^{-1}

Ans :(d) JKg^{-1}K^{-1}

3. ..... is the highest specific heat capacity.

(a) Oil (b) Steam (c) Water (d) Ice cube **Ans :(c) Water**

4. Melting point of water is ..... .

(a) 10°c (b) 0°c (c) 150°c (d) 180°c **Ans :(b) 0°c**

5. Condensation of water is..... .

(a)0°c (b) 100°c (c) 150°c (d) 180°c **Ans :(b) 100°c**

UNIT - 11. Atomic Structure

TEXT BOOK EXERCISES

I. Choose the correct answer.

1. Among the following the odd pair is

a) $^{18}_{8}O$, $^{19}_{9}F$ b) $^{40}_{18}Ar$, $^{14}_{7}N$, c) $^{30}_{14}Si$, $^{31}_{15}P$, d) $^{40}_{20}Cr$, $^{39}_{19}K$

Ans : c) $^{30}_{14}Si$, $^{31}_{15}P$

2. Change in the number of neutrons in an atom changes it to

a) an ion b)an isotope c) an isobar d) another element

Ans : b) an isotope

3. The term nucleons refer to

a) protons and electrons b) only neutrons
c) electrons and neutrons d) protons and neutrons

Ans : d) protons and neutrons

4. The number of protons,neutrons and electrons present respectively in $^{80}_{35}Br$ are

a) 80,80,35 b)35,55,80 c) 35,35,80 d) 35,45,35 **Ans : d) 35,45,35**

5. The correct electronic configuration of potassium is

a) 2,8,9 b) 2,8,1 c) 2,8,8,1 d) 2,8,8,3 **Ans : c) 2, 8, 8, 1**

II. State true or false. If false, correct the statement.

1. In an atom, electrons revolve around the nucleus in fixed orbits. **Ans : True**
2. Isotopes of an element have different atomic numbers. **Ans : False**

Correct statement : Isotopes of an element have **same** atomic numbers.

3. Electrons have negligible mass and charge. **Ans : True**
4. Smaller the size of the orbit, lower is the energy of the orbit. **Ans : True**
5. The maximum number of electron in L Shell is 10. **Ans : False**

Correct statement : The maximum number of electron in L shell is **8**.

III. Fill in the blanks.

1. Calcium and Argon are examples of a pair of _____. **Ans : isobars**
2. Total number of electrons that can be accommodated in an orbit is given by _____. **Ans : $2n^2$**
3. _____ isotope is used in the nuclear reactors. **Ans : Uranium - 235**
4. The number of neutrons present in $^{7}_{3}Li$ is _____ . **Ans : 4**
5. The valency of Argon is _____ . **Ans : 0**

IV. Match the following.

				Ans :			
a)	Dalton	1.	Hydrogen atom model	**a)**	**Dalton**	**3.**	**First atomic theory**
b)	Chadwick	2.	Discovery of nucleus	**b)**	**Chadwick**	**5.**	**Discovery of neutrons**
c)	Rutherford	3.	First atomic theory	**c)**	**Rutherford**	**2.**	**Discovery of nucleus**
d)	Neils Bohr	4.	Plum pudding model	**d)**	**Neils Bohr**	**1.**	**Hydrogen atom model**
		5.	Discovery of neutrons				

V. Complete the following table.

Atomic Number	Mass Number	Number of Neutrons	Number of Protons	Number of Electrons	Name of the Element
9	-	10	-	-	-
16	-	16	-	-	-
-	24	-	-	12	Magnesium
-	2	-	1	-	-
-	1	0	1	1	-

Ans :

Atomic Number	Mass Number	Number of Neutrons	Number of Protons	Number of Electrons	Name of the Element
9	19	10	9	9	Fluorine
16	32	16	16	16	Sulphur
12	24	12	12	12	Magnesium
1	2	1	1	1	Hydrogen (Deuterium)
1	1	0	1	1	Hydrogen (Protium)

VI. Answer very briefly.

1. Name an element which has the same number of electrons in its first and second shell.

Ans : K L

Beryllium $_4Be^9$ - 2, 2

2. Write the electronic configuration of K and Cl.

Ans : K = 2,8,8,1 and Cl = 2,8,7

3. Write down the names of the particles represented by the following symbols and explain the meaning of superscript and subscript numbers attached.

$_1H^1$, $_0n^1$, $_{-1}e^0$

Ans :

Particle	Symbol	Superscript mass	Subscript Charge
Proton	$_1H^1$	1	+1
Neutron	$_0n^1$	1	0
Electron	$_{-1}e^0$	0	-1

4. For an atom 'X', K, L and M shells are completely filled. How many electrons will be present in it?

Ans : X(CalciumAtom) K-2, L-8, M-8, = 2+8+8=18

4. Calculate the number of neutrons, protons and electrons:
(i) atomic number 3 and mass number 7
(ii)atomic number 92 and mass number 238

Ans : (i) Atomic number = 3
Mass number = 7
Atomic number = Number of protons
Number of protons = 3
Number of electrons = 3
Number of neutrons = 7-3 = 4

Ans : (ii) Atomic number = 92
Mass number = 238
Atomic number = Number of protons
Number of protons = 92
Number of electrons = 92
Number of neutrons = 238-92 = 146

∴ Number of protons = number of electrons
Mass number = Number of protons + Number of neutrons
Number of neutrons = Mass number - Number of protons

5. What are nucleons? How many nucleons are present in Phosphorous? Draw its structure.

Ans : The protons and neutrons (collectively called nucleons) are found in the nucleus of an atom. These are called nucleons.

(15 p + 16 n) = 31 nucleons are present in phosphorus.

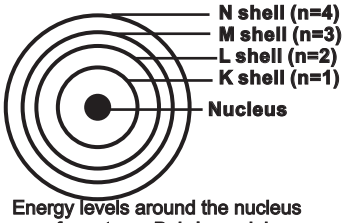
VIII. Answer in detail.

1. What conclusions were made from the observations of Gold foil experiment?

Ans :
- The atom contains large empty space.
- There is a positively charged mass at the centre of the atom, known as nucleus.
- The size of the nucleus of an atom is very small compared to the size of an atom.
- The electrons revolve around the nucleus in close circular paths called orbits.
- An atom as a whole is electrically neutral,
  i.e., the number of protons and electrons in an atom are equal.

2. Explain the postulates of Bohr's atomic model.

Ans : Postulates of Bohr's Atomic Model :



Energy levels around the nucleus of an atom : Bohr's model

i) In atoms, the electrons revolve around the nucleus in stationary circular paths called orbits or shells or energy levels.

ii) While revolving around the nuclear in an orbit, an electron neither loses nor gains energy.

iii) An electron in a shell can move to a higher or lower energy shell by absorbing or releasing a fixed amount of energy.

iv) The orbits or shells are represented by the letters K, L, M, N, ... or the numbers, n = 1, 2. 3, 4, ...

- The orbit closest to the nucleus is the K shell.
- It has the least amount of energy and the electrons present in it are called K electrons, and so on with the successive shells and their electrons.

UNIT - 12. Periodic Classification of Elements

TEXT BOOK EXERCISES

I. Choose the correct answer.

1. If Dobereiner is related with 'law of triads', then Newlands is related with

a) Modern periodic law b) Hund's rule
c) Law of octaves d) Pauli's Exclusion principle

Ans :c) Law of octaves

2. Modern periodic law states that the physical and chemical properties of elements are the periodic functions of their

a) atomic numbers b) atomic masses
c) similarities d) anomalies

Ans : a) atomic numbers

3. Elements in the modern periodic table are arranged in .....groups and..... periods.

a) 7, 18 b) 18,7 c) 17,8 d) 8, 17 **Ans : b) 18,7**

II. Fill in the blanks.

1. In Dobereiner's triads, the atomic weight of the middle element is the ..... of the atomic masses of 1st and 3rd elements. **Ans : average**
2. Noble gases belong to ..... group of the periodic table. **Ans : 18th**
3. The basis of the classifications proposed by Dobereiner, Newlands and Mendeleev was ..... . **Ans : atomic mass**
4. Example for liquid metal is ..... . **Ans : mercury**

III. Match the following .

1.	Triads	a)	Newlands
2.	Alkali metal	b)	Calcium
3.	Law of octaves	c)	Henry Moseley
4.	Alkaline earth metal	d)	Sodium
5.	Modern Periodic Law	e)	Dobereiner

Ans :

1.	**Triads**	**e)**	**Dobereiner**
2.	**Alkali metal**	**d)**	**Sodium**
3.	**Law of octaves**	**a)**	**Newlands**
4.	**Alkaline earth metal**	**b**	**Calcium**
5.	**Modern Periodic Law**	**c)**	**Henry Moseley**

IV. State true or false . If false, correct the statement.

1.Newlands' periodic table is based on atomic masses of elements and modern periodic table is based on atomic number of elements. **Ans : True**

2. Metals can gain electrons. **Ans : False**

Correct statement : Metals can **lose** electrons.

3. Alloys bear the characteristics of both metals and nonmetals. **Ans : False**

Correct statement : Metalloids bear the characteristics of both metals and nonmetals.

UNIT - 15. Carbon and its Compounds

TEXT BOOK EXERCISES

I. Choose the correct answer.

1. A phenomenon in which an element exists in different modification in same physical state is called

(a) isomerism (b) allotropy
(c) catenation (d) crystallinity **Ans : (a) isomerism**

2 . Carbon forms large number of organic compounds due to

(a) allotropy (b) isomerism
(c) tetravalency (d) catenation **Ans : (d) catenation**

3. Nandhini brings his lunch every day to school in a plastic container which has resin code number 5. The container is made of

(a) Polystyrene (b) PVC
(c) Polypropylene (d) LDPE **Ans : (c) Polypropylene**

4. Plastics made of Polycarbonate (PC) and Acrylonitrile Butadiene Styrene (ABS) are made of resin code _____ .

(a) 2 (b) 5 (c) 6 (d) 7 **Ans : (d) 7**

5. Graphene is one atom thick layer of carbon obtained from

(a) diamond (b) fullerene
(c) graphite (d) gas carbon **Ans : (c) graphite**

6. The legal measures to prevent plastic pollution come under the _____ Protection Act 1988.

(a) Forest (b) Wildlife
(c) Environment (d) Human rights **Ans : (c) Environment**

II. Fill in the blanks.

1. _____ named carbon. **Ans : Antoine Lavoisier**
2. Buckminster Fullerene contains _____ carbon atoms. **Ans : 60**
3. Compounds with same molecular formula and different structural formula are known as _____. **Ans : isomerism**
4. _____ is a suitable solvent for sulphur. **Ans : Carbon disulphide**
5. There are _____ plastic resin codes. **Ans : 7**

III. Match the following

1.	Alkyne	-	a)	Bucky Ball
2.	Andre Geim	-	b)	Oxidation
3.	C_{60}	-	c)	Graphene
4.	Thermocol	-	d)	Triple bond
5.	Combution	-	e)	Polystyrene

Ans :

1.	**Alkyne**	**- d)**	**Triple bond**
2.	**Andre Geim**	**- c)**	**Graphene**
3.	**C_{60}**	**- a)**	**Bucky Ball**
4.	**T hermocol**	**- e)**	**Polystyrene**
5.	**Combution**	**- b)**	**Oxidation**

IV. Answer briefly.

1. Differentiate graphite and diamond.

Ans :

S.No.	Graphite	Diamond
1.	Each carbon has three covalent bonds.	Each carbon has four covalent bonds.
2.	Soft , slippery to touch and opaque.	Hard, heavy and transparent.

3.	It has planar layers of hexagon units.	It has tetrahedral units linked in three dimension.
4.	It is a conductor of heat and electricity.	It is a non-conductor of heat and electricity.

2. Write all possible isomers of C_4H_{10}.

Ans : a) $CH_3 - CH_2 - CH_2 - CH_3$ b) $CH_3 - CH(CH_3) - CH_3$

3. Carbon forms only covalent compounds. Why?

Ans : ★ Carbon forms only covalent compounds due to catenation.

★ Catenation is binding of an element to itself or with other elements through covalent bonds to form open chain or closed chain compounds.

4. Define Allotrophy.

Ans : Allotrophy is a property by which an element can exist in more than one form that are physically different and chemically similar.

5. Why are one-time use and throwaway plastics harmful?

Ans : ★ Use and throwaway plastics cause short and long-term environmental damage.

★ These block drains and pollute water bodies.

★ One-time use plastic causes health problems for humans, plants and animals.

V. Answer in detail.

1. What is catenation? How does carbon form catenated compounds?

Ans : Catenation : Catenation is binding of an element to itself or with other elements through covalent bonds to form open chain or closed chain compounds.

Catenation of Carbon:

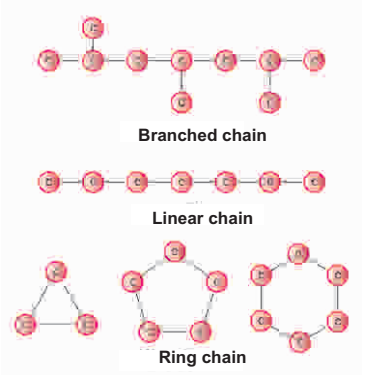
★ Carbon is the most common element which undergoes catenation and forms long chain compounds.

★ Carbon atom links repeatedly to itself through covalent bond to form linear chain, branched chain or ring structure.

★ This property of carbon itself is the reason for the presence of large number of organic carbon compounds.

★ So organic chemistry essentially deals with catenated carbon compounds.

★ For example, starch and cellulose contain chains of hundreds of carbon atoms.



Catenation in carbon

2. What are the chemical reactions of carbon?

Ans : Oxidation - (Reaction with oxygen):

★ Carbon combines with oxygen to form its oxides like carbon monoxide (CO) and carbon dioxide (CO_2) with evolution of heat.

$$2C_{(s)} + O_{2(g)} \rightarrow 2CO_{(g)} + \text{heat}$$

$$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)} + \text{heat}$$

★ Organic carbon compounds like hydrocarbon also undergo oxidation to form oxides and steam with evolution of heat and flame. This is otherwise called combustion.

$$CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(g)} + \text{heat}$$

Reaction with steam :

★ Carbon reacts with steam to form carbon monoxide and hydrogen. This mixture is called water gas.

UNIT - 17. Animal Kingdom

TEXT BOOK EXERCISES

I. Choose the correct answer.

1. Find the group having only marine members.
a) Mollusca c) Coelenterata c) Echinodermata d) Porifera
Ans : c) Echinodermata

2. Mesoglea is present in
a) Porifera b) Coelenterata c) Annelida d) Arthropoda
Ans : b) Coelenterata

3. Which one of the following pairs is not a poikilothermic animal?
a) Fishes and Amphibians b) Amphibians and Aves
c) Aves and Mammals d) Reptiles and Mammals **Ans : c) Aves and Mammals**

4. Identify the animal having four chambered heart.
a) Lizard b) Snake c) Crocodile d) Calotes **Ans : c) Crocodile**

5. The animal without skull is
a) Acrania b) Acephalia c) Apteria d) Acoelomate **Ans : a) Acrania**

6. Hermaphrodite organisms are
a) Hydra, Tape worm, Earthworm, Amphioxus
b) Hydra, Tape worm, Earthworm, Ascidian
c) Hydra, Tape worm, Earthworm, Balanoglossus
d) Hydra, Tape worm, Ascaris, Earthworm
Ans : b) Hydra, Tape worm, Earthworm, Ascidian

7. Poikilothermic organisms are
a) Fish, Frog, Lizard, Man b) Fish, Frog, Lizard, Cow
c) Fish, Frog, Lizard, Snake d) Fish, Frog, Lizard, Crow
Ans : c) Fish, Frog, Lizard, Snake

8. Air sacs and pneumatic bones are seen in
a) fish b) frog c) bird d) bat **Ans : c) bird**

9. Excretory organ of tape worm is
a) Flame cells b) Nephridia c) Body surface d) Solenocytes
Ans : a) Flame cells

10. Water vascular system is found in
a) Hydra b) Earthworm c) Star fish d) Ascaris **Ans : c) Star fish**

II. Fill in the blanks.
1. The skeletal framework of Porifera is _____. **Ans : spicules**
2. Ctenidia are respiratory organs in _____. **Ans : phylum mollusca**
3. Skates are _____ fishes. **Ans : cartilaginous**
4. The larvae of an amphibian is _____. **Ans : tadpole**
5. _____ are jawless vertebrates. **Ans : Cyclostomes**
6. _____ is the unique characteristic feature of mammal. **Ans : Placenta**
7. Spiny anteater is an example for _____ mammal. **Ans : egg laying**

III. State whether true or false. If false, correct the statement.
1. Canal system is seen in coelenterates. **Ans : False**
Correct statement: Canal system is seen in **porifera.**
2. Hermaphrodite animals have both male and female sex organs. **Ans : True**

3. Trachea are the respiratory organ of Annelida. **Ans : False**
Correct statement: Trachea are the respiratory organ of **Arthropoda**.
4. Bipinnaria is the larvae of Mollusca. **Ans : False**
Correct statement: Bipinnaria is the larvae of **Echinodermata**.
5. Balanoglossus is a ciliary feeder. **Ans : True**
6. Fishes have two chambered heart. **Ans : True**
7. Skin of reptilians are smooth and moist. **Ans : False**
Correct statement: Skin of **Amphibians** are smooth and moist.
8. Wings of birds are the modified forelimbs. **Ans : True**
9. Female mammals have mammary glands. **Ans : True.**

IV. Match the following.

	PHYLUM		EXAMPLES
(A)	Coelenterata	(i)	Snail
(B)	Platyhelminthes	(ii)	Star fish
(C)	Echinodermata	(iii)	Tapeworm
(D)	Mollusca	(iv)	Hydra

Ans :

	PHYLUM		EXAMPLES
(A)	**Coelenterata**	**(iv)**	**Hydra**
(B)	**Platyhelminthes**	**(iii)**	**Tapeworm**
(C)	**Echinodermata**	**(ii)**	**Star fish**
(D)	**Mollusca**	**(i)**	**Snail**

V. Answer very briefly.

1. Define taxonomy.
Ans : Taxonomy is the science of classification which makes the study of wide variety of organisms easier.

2. What is nematocyst ?
Ans : In coelenterata, the tentacles bear stinging cells called cnidoblast or nematocyst.

3. Why coelenterates are called diploblastic animals?
Ans : Body wall is diploblastic with two layers. An outer ectoderm and inner endoderm. So, coelenterates are called diploblastic animals.

4. List the respiratory organs of amphibians.
Ans : 1. Gills 2. Lungs 3. Skin 4. Buccopharynx

5. How does locomotion take place in starfish?
Ans : In starfish locomotion takes place by tube feet.

6. Are jellyfish and starfish similar to fishes? If no justify the answer.
Ans : No.
Reason :
Jelly fish - Coelenterata - Invertebrata
Star fish - Echinodermata - Invertebrata
Fishes - Vertebrata - chordata

7. Why are frogs said to be amphibians?
Ans :
✶ Frogs have dual adaptation, to live in land as well as in water.
✶ Hence, they are known as amphibians.

UNIT - 18. Organisation of Tissues

TEXT BOOK EXERCISES

I. Choose the correct answer.

1. The tissue composed of living thin walled polyhedral cell is
a. parenchyma b. collenchyma c. sclerenchyma d. none of above
Ans : a. parenchyma

2. The fibres consists of
a. parenchyma b. sclerenchyma c. collenchyma d. none of above
Ans : b. sclerenchyma

3. Companion cells are closely associated with
a. sieve elements b. vessel elements c. trichomes d. guard cells
Ans : a. sieve elements

4. Which of the following is a complex tissue?
a. parenchyma b. collenchyma c. xylem d. sclerenchyma
Ans : c. xylem

5. Aerenchyma is found in
a. epiphytes b. hydrophytes c. halophytes d. xerophytes
Ans : b. hydrophytes

6. Smooth muscles occur in
a. uterus b artery c. vein d. all of the above
Ans : d. all of the above

7. Nerve cell does not contains
a. axon b. nerve endings c. tendons d. dendrites
Ans : c. tendons

II. Match the following.

1.	Sclereids	a)	Chlorenchyma
2.	Chloroplast	b)	Sclerenchyma
3.	Simple tissue	c)	Collenchyma
4.	Companion cell	d)	Xylem
5.	Trachieds	e)	Phloem

Ans :

1.	**Sclereids**	**b)**	**Sclerenchyma**
2.	**Chloroplast**	**a)**	**Chlorenchyma**
3.	**Simple tissue**	**c)**	**Collenchyma**
4.	**Companion cell**	**e)**	**Phloem**
5.	**Trachieds**	**d)**	**Xylem**

III. Fill in the blanks .

1. ..... tissues provide mechanical support to organs. **Ans : Collenchyma**
2. Parenchyma, collenchyma, Sclerenchyma are ..... type of tissue. **Ans : simple**
3. ..... and ..... are complex tissues. **Ans : Xylem, Phloem**
4. Epithelial cells with cilia are found in ..... of our body . **Ans : trachea**
5. Lining of small intestine is made up of ..... . **Ans : columnar epithelium**

IV. State whether true or false. If false, correct the statement.

1. Epithelial tissue is protective tissue in animal body. **Ans : True**
2. Bone and cartilage are two types of areolar connective tissues. **Ans : False**
   Correct statement : Bone and cartilage are two types of **supportive** connective tissue.
3. Parenchyma is a simple tissue. **Ans : True**

VI. Answer in Detail.

1. What are permanent tissues? Describe the different types of simple permanent tissues.

Ans : Permanent Tissues:

★ Permanent tissues are those in which, growth has stopped either completely or for the time being.

★ At times, they become meristematic partially or wholly.

★ Permanent tissues are of two types, namely : (1) simple tissue (2) complex tissue.

Simple Tissues :

★ Simple tissue are homogeneous tissues composed of structurally and functionally similar cells. eg. (i) Parenchyma, (ii)Collenchyma, (iii)Sclerenchyma.

(i).Parenchyma :

★ Parenchyma are simple permanent tissues composed of living cells.

★ They are thin walled, oval, rounded or polygonal in shape with well developed spaces among them.

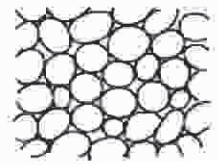
★ In aquatic plants, parenchyma possesses intercellular air spaces, and is named as Aerenchyma.

★ When exposed to light, parenchyma cells may develop chloroplasts and are known as Chlorenchyma.

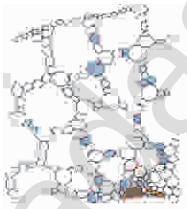
Functions:

★ Parenchyma may store water in many succulent and xerophytic plants.

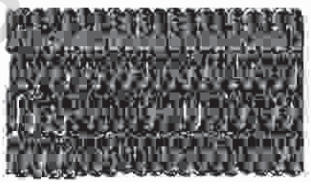
★ It also serves the functions of storage of food reserves, absorption, buoyancy, secretion etc.,



Parenchyma



Aerenchyma



Chlorenchyma

Types of Parenchyma

(ii). Collenchyma :

★ Collenchyma is a living tissue found beneath the epidermis.

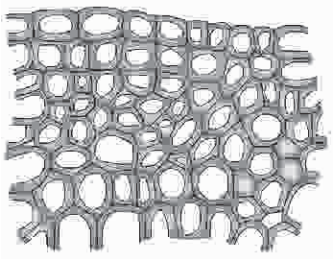
★ Cells are elongated with unevenly thickened walls.

★ Cells have rectangular oblique or tapering ends and persistent protoplast.

★ They possess thick primary non-lignified walls.

Function:

★ They provide mechanical support for growing organs.



Collenchyma

(iii). Sclerenchyma :

★ Sclerenchyma consists of thick walled cells which are often lignified.

★ Sclerenchyma cells are dead and do not possess living protoplasts at maturity.

★ Sclerenchyma cells are grouped into (1) fibres and (2) sclereids.

(1) Fibres :

★ Fibres are elongated sclerenchymatous cells, usually with pointed ends.

★ Their walls are lignified.

★ Fibres are abundantly found in many plants.

Part - III.
Answer briefly. (Four Marks)
1. a) Define - Bone marrow.
Ans :
In bones, the hollow cavities of spaces are called marrow cavities filled with bone marrow.

b) What are the types of WBC?
Ans : WBC's are of two types :
1. Granulocytes (with granules in the cytoplasm)
   They are neutrophils, basophils, eosinophils.
2. Agranulocytes (without granules in the cytoplasm)
   They are lymphocytes, monocytes.

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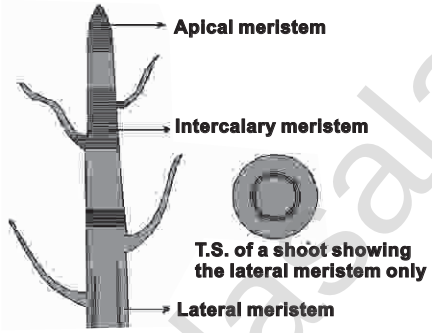
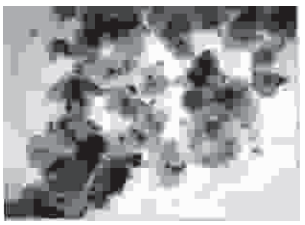
2. Draw neat sketch of Longitudinal section of shoot apex and its parts.
Ans :

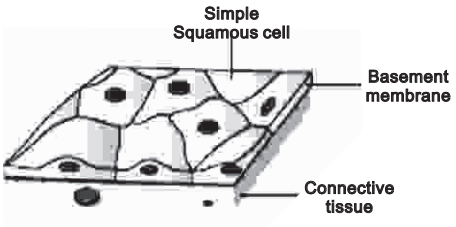


Longitudinal section of shoot apex

Activity 1 :
i. Rinse your mouth with water.
ii. Using a tooth pick or ice-cream stick, scrap superficial cells from inner side of the cheek and spread it on a clean glass slide.
iii. Dry the glass slide with the scrap cells taken from the inner side of cheek.
iv. Add two drops of methylene blue stain.
v. Identify the cells under low and high power of the microscope.



Ans : Name of the epithelium - Squamous epithelium
Squamous Epithelium: It is made up of thin, flat cells with prominent nuclei.
★ These cells have irregular boundaries and bind with neighbouring cells.
★ The squamous epithelium is also known as pavement membrane, which form delicate lining of the buccal cavity, alveoli of lungs, proximal tubule of kidneys, blood vessels and covering of the skin and tongue.
★ It protects the body from mechanical injury, drying and invasion of germs.



UNIT - 21. Nutrition and Health

TEXT BOOK EXERCISES

I. Choose the correct answer.

1. The nutrient required in trace amounts to accomplish various body functions is ..... .
a) carbohydrate b) protein c) vitamin d) fat **Ans : c) vitamin**

2. The Physician who discovered that scurvy can be cured by ingestion of citrus fruits is ..... .
a) James Lind b) Louis Pasteur c) Charles Darwin d) Isaac Newton
Ans :a) James Lind

3. The sprouting of onion and potatoes can be delayed by the process of ..... .
a) freezing b) irradiation c) salting d) canning
Ans :b) irradiation

4. Food and Adulteration Act was enforced by Government of India in the year..... .
a) 1964 b) 1954 c) 1950 d) 1963 **Ans : b) 1954**

5. An internal factor responsible for spoilage of food is ..... .
a) wax coating b) contaminated utensils
c) moisture content in food d) synthetic preservatives
Ans :c) moisture content in food

II. Fill in the blanks.

1. Deficiency diseases can be prevented by taking..... diet.
Ans :balanced
2. The process of affecting the natural composition and the quality of food substance is known as ..... . **Ans :adulteration**
3. Vitamin D is called as..... vitamin as it can be synthesised by the body from the rays of sunlight. **Ans : sunshine**
4. Dehydration is based on the principle of removal of..... .
Ans : water
5. Food should not be purchased beyond the date of..... . **Ans : expiry**
6. AGMARK is used to certify..... and ..... products in India.
Ans : agricultural, livestock

III. State whether true or false. If false, correct the statement.

1. Iron is required for the proper functioning of thyroid gland. **Ans :False**
Correct Statement : Iodine is required for the proper functioning of thyroid gland.
2. Vitamins are required in large quantities for normal functioning of the body.
Ans :False
Correct Statement : Vitamins are required in **minute** quantities for normal functioning of the body.
3. Vitamin C is a water soluble vitamin. **Ans :True**
4. Lack of adequate fats in diet may result in low body weight. **Ans : True**
5. ISI mark is mandatory to certify agricultural products. **Ans :False**
Correct Statement : AGMARK mark is mandatory to certify agricultural products.

IV. Match the following.

Column A	Column B
1. Calcium	a. Muscular fatigue
2. Sodium	b. Anaemia
3. Potassium	c. Osteoporosis
4. Iron	d. Goitre
5. Iodine	e. Muscular cramps

Ans :

Column A	Column B
1.Calcium	c. Osteoporosis
2.Sodium	e. Muscular cramps
3. Potassium	a. Muscular fatigue
4.Iron	b. Anaemia
5.Iodine	d. Goitre

V. Fill in the blanks with suitable answers.

Vitamins	Dietary Source	Deficiency Disease
Calciferol	----------	Rickets
----------	Papaya	Night blindness
Ascorbic acid	----------	----------
----------	Whole grains	Beriberi

Ans :

Vitamins	Dietary Source	Deficiency Disease
Calciferol	Egg	Rickets
Retinol	Papaya	Night blindness
Ascorbic acid	Citrus fruits	Scurvy
Thiamine	Whole grains	Beriberi

VI. Give abbreviations for the following.

Ans:

i. ISI - Indian Standards Institution
ii. FPO - Fruit Process Order
iii. AGMARK - Agricultural Marking
iv. FCI - Food Corporation of India
v. FSSAI - Food Safety and Standards Authority of India

VII. Assertion and reason type questions.

Direction : In the following question, a statement of a Assertion is given and a corresponding Reason is given just below it. Of the statements given below, mark the correct answer as:

1. **Assertion :** Haemoglobin contains iron.
   Reason : Iron deficiency leads to anaemia.

(a) If both Assertion and Reason are true and the Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) If Assertion is true but Reason is false. (d) If both Assertion and Reason is false.

Ans : (a) If both Assertion and Reason are true and the Reason is the correct explanation of Assertion.

2. **Assertion :** AGMARK is a quality control agency.
   Reason : ISI is a symbol of quality.

(a) If both Assertion and Reason are true and the Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) If Assertion is true but Reason is false. (d) If both Assertion and Reason is false.

Ans : (d) If both Assertion and Reason is false.

UNIT - 22. World of Microbes

TEXT BOOK EXERCISES

I. Choose the correct answer.

1. Which of the following is transmitted through air?
a) Tuberculosis b) Meningitis c) Typhoid d) Cholera **Ans : a)Tuberculosis**

2. One of the means of indirect transmission of a disease is
a) sneezing b) coughing c) vectors d) droplet infection
Ans : c) vectors

3. Diptheria affects the
a) Lungs b) Throat c) Blood d) Liver **Ans : b) Throat**

4. The primary organ infected during tuberculosis is
a) bone marrow b) intestine c) spleen d) lungs **Ans : d) lungs**

5. Microbes that generally enter the body through nose are likely to affect
a) gut b) lungs c) liver d) lymph nodes **Ans : b) lungs**

6. The organ affected by jaundice is
a) liver b) lungs c) kidney d) brain **Ans : a) liver**

7. Poliomyelitis virus enters the body through
a) skin b) mouth and nose c) ears d) eye **Ans : b) mouth and nose**

II. Fill in the blanks.

1. _____ break down organic matter and animal waste into ammonia.
Ans : Putrefying bacteria
2. Typhoid fever is caused by _____. **Ans : Salmonella typhi**
3. H1N1 virus causes _____. **Ans : Swine Flu**
4. _____ is a vector of viral disease dengue. **Ans : Aedes aegypti mosquito**
5. _____ vaccine gives considerable protection against tuberculosis. **Ans : BCG**
6. Cholera is caused by _____ and malaria is caused by _____.
Ans : Vibrio cholerae, Plasmodium

III. Expand the following.

1)	**ORS**	-	Oral Rehydration Solution
2)	**HIV**	-	Human Immuno deficiency Virus
3)	**DPT**	-	Diphtheria, Pertussis and Tetanus
4)	**WHO**	-	World Health Organisation
5)	**BCG**	-	Bacillus Calmette Guerin

IV. Pick out the odd one.

i) AIDS, Retrovirus, Lymphocytes, BCG.
Ans : BCG

ii) Bacterial disease, Rabies, Cholera, Common cold and Influenza.
Ans : Cholera

V. State whether true or false. If false, correct the statement.

1. Rhizobium, associated with root nodules of leguminous plants fixes atmospheric nitrogen. **Ans : True**
2. Non- infectious diseases remain confined to the person who develops the disease and do not spread to others. **Ans : True**

3. What is triple antigen? Mention the disease which can be prevented by using the antigen.

Ans : Triple antigen :

★ Three kind of antigens in a single vaccine produced against bacterial diseases is called triple antigen.

★ DPT(Triple vaccine) is a combined vaccine for protection against bacterial diseases.

Diseases prevented by DPT :

1. Diphtheria
2. Pertussis
3. Tetanus

---

4. Name the chronic diseases associated with respiratory system.

Ans : Tuberculosis, Whooping cough, Common cold, Mumps, Chicken pox.

---

5. Name the organism causing diarrhoeal disease and give one precaution against it.

Ans : Organism - Rotavirus
Precaution - Proper sanitation and hygiene

---

6. Name two common mosquitoes and the diseases they transmit.

Ans : 1. Aedes aegypti mosquito - Dengue, Chikungunya
2. Female Anopheles mosquito - Malaria

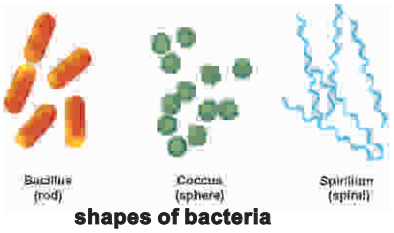
IX. Answer briefly.

1. Give an account of classification of bacteria based on the shape.

Ans : Shapes of bacteria :

Based on the shapes, bacteria are grouped as:

1. Spherical shaped bacteria called as cocci (or coccus for a single cell).
2. Rod shaped bacteria called as bacilli (or bacillus for a single cell).
3. Spiral shaped bacteria called as spirilla (or spirillum for single cell).



shapes of bacteria

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2. Describe the role of microbes in agriculture and industries.

Ans : a. <u>Microbes in Agriculture :</u>

Microbes play an important role in agriculture as biocontrol agents and biofertilizers.

<u>(i) Microbes as biofertilizers :</u>

★ Microorganisms which enrich the soil with nutrients are called as biofertilizers.

★ Bacteria, Cyanobacteria and Fungi are the main sources of biofertilizers.

★ Nitrogen is one of the main source of plant nutrients.

★ Atmospheric nitrogen has to be converted to available form of nitrogen.

★ This is done by microbes either in free living conditions or by having symbiotic relationship with the plants.

★ e.g. Azotobacter, Nitrosomonas, Nostoc (free living), symbiotic microbes like Rhizobium, Frankia .

<u>(ii) Microbes as biocontrol agents :</u>

★ Bacillus thuringiensis (Bt) is a species of bacteria that produces a protein called as 'cry' protein. This protein is toxic to the insect larva and kills them.

b. <u>Microbes in Industries :</u>

Microorganisms play an important role in the production of wide variety of valuable products for the welfare of human beings.

(i) Production of fermented beverages:

★ Beverages like wine are produced by fermentation of grape fruits by Saccharomyces cerevisiae.

(ii) Curing of coffee beans, tea leaves and tobacco leaves:

★ Beans of coffee and cocoa, leaves of tea and tobacco are fermented by the bacteria Bacillus megaterium. This gives the special aroma.

(iii) Production of curd:

★ Lactobacillus sp. converts milk to curd.

(iv) Production of organic acids, enzymes and vitamins:

★ Oxalic acid, acetic acid , citric acid are produced by fungus Aspergillus niger.

★ Enzymes like lipases, invertase, proteases and glucose oxidase are derived from microbes.

★ Yeasts are rich source of vitamin-B complex.

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3. Explain the various types of viruses with examples.

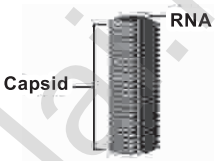
Ans : Types of Viruses :

Viruses are categorised as given below :

i. Plant virus:

★ Virus that infect plants.

★ E.g. Tobacco mosaic virus, Cauliflower mosaic virus, Potato virus.

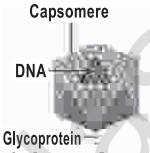


Tobacco mosaic virus

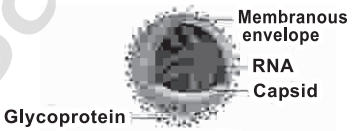
ii. Animal virus:

★ Virus that infect animals.

★ E.g. Adenovirus, Retrovirus(HIV), Influenza virus, Polio virus.



Adenovirus



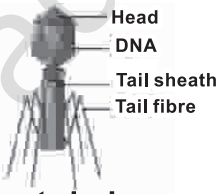
Influenza virus

Animal virus

iii. Bacteriophages:

★ Virus that infect bacterial cells.

★ E.g. T4 bacteriophage.



T4 bacteriophage

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4. Suggest the immunization schedule for a new born baby till 12 months of age. Why it is necessary to follow the schedule?

Ans : a. Immunization Schedule

Age	Vaccine	Dosage
New born	BCG	1st dose
15 days	Oral Polio	1st dose
6th week	DPT and Polio	1st dose
10th week	DPT and Polio	1st dose
14th week	DPT and Polio	1st dose
9-12 months	Measles	1st dose

3. Swine flu first surfaced in ..... .
(a) 2005 (b) 2007
(c) 2009 (d) 2008 **Ans :(c) 2009**

4. The process of vaccination was introduced by ..... .
(a) Robert koch (b) Louis pasteur
(c) Sir Ronald Ross (d) Edward Jenner **Ans : (d) Edward Jenner**

5. ..... was the Father of Bacteriology.
(a) Robert koch (b) Edward Jenner
(c) Louis pasteur (d) Sir Ronald Ross **Ans :(a) Robert koch**

Part - II.
Answer very briefly. (Two Marks)

1. a) The body of the fungus is ..... .
   b) ..... are rich source of vitamin -B Complex.
   Ans : a) Thallus b) Yeasts
2. a) Filaria is transmitted by the bite of infected ..... mosquito.
   b) Dengue is known as ..... fever.
   Ans : a) Culex b) break bone

3. Match the following :

1.	World Health Day	-	25th April
2.	World Malaria Day	-	24th March
3.	World AIDS Day	-	7th April
4.	World Anti-Tuberculosis Day	-	1st December

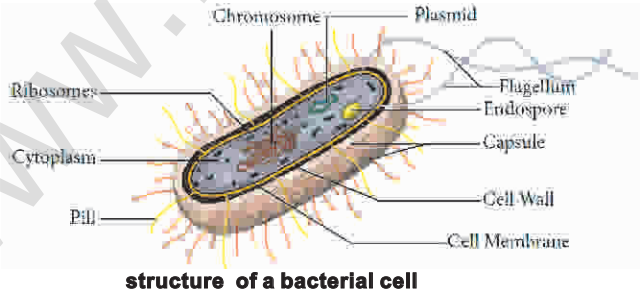
Answer :

1.	**World Health Day**	**-**	**7th April**
2.	**World Malaria Day**	**-**	**25th April**
3.	**World AIDS Day**	**-**	**1st December**
4.	**World Anti -Tuberculosis Day**	**-**	**24th March**

Part - III.
Answer briefly. (Four Marks)

1. Draw the structure of a bacterial cell and label the parts.

Ans :



structure of a bacterial cell

UNIT - 24. Environmental Science

TEXT BOOK EXERCISES

I. Choose the correct answer.

1. All the factors of biosphere which affect the ability of organisms to survive and reproduce are called as _____.

a) biological factors b) abiotic factors
c) biotic factors d) physical factors **Ans : b) abiotic factors**

2. The ice sheets from the north and south poles and the icecaps on the mountains, get converted into water vapour through the process of_____.

a) evaporation b) condensation
c) sublimation d) infiltration **Ans :c) sublimation**

3. The atmospheric carbon dioxide enters into the plants through the process of_____.

a) photosynthesis b) assimilation
c) respiration d) decomposition **Ans : a) photosynthesis**

4. Increased amount of _____ in the atmosphere, results in greenhouse effect and global warming.

a) carbon monoxide b) sulphur dioxide
c) nitrogen dioxide d) carbon dioxide **Ans : d) carbon dioxide**

II. Match the following. **Ans :**

S.No	Microorganism		Role Played
1.	Nitrosomonas	a)	Nitrogen fixation
2.	Azotobacter	b)	Ammonification
3.	Pseudomonas species	c)	Nitrification
4.	Putrefying bacteria	d)	Denitrification

S.No	Microorganism		Role Played
1.	Nitrosomonas	c)	Nitrification
2.	Azotobacter	a)	Nitrogen fixation
3.	Pseudomonas species	d)	Denitrification
4.	Putrefying bacteria	b)	Ammonification

III. State whether true or false. If false, correct the statement.

1. Nitrogen is a greenhouse gas. **Ans : False**
   Correct Statement : Carbon dioxide is a greenhouse gas.
2. Poorly developed root is an adaptation of mesophytes. **Ans : False**
   Correct Statement : Poorly developed root is an adaptation of **hydrophytes**.
3. Bats are the only mammals that can fly. **Ans : True**
4. Earthworms use the remarkable high frequency system called echoes. **Ans : False**
   Correct Statement : Bats use the remarkable high frequency system called echoes.
5. Aestivation is an adaptation to overcome cold condition. **Ans : False**
   Correct Statement : Hibernation is an adaptation to overcome cold condition.

IV. Give reason for the following.

1. Roots grow very deep and reach the layers where water is available. Which type of plants develops the above adaptation? Why?

Ans : Xerophytes.

★ They have well developed roots. Roots grow very deep and reach the layers where water is available as in Calotropis.

2. Explain carbon cycle with the help of a flow chart?

Ans : Carbon cycle :

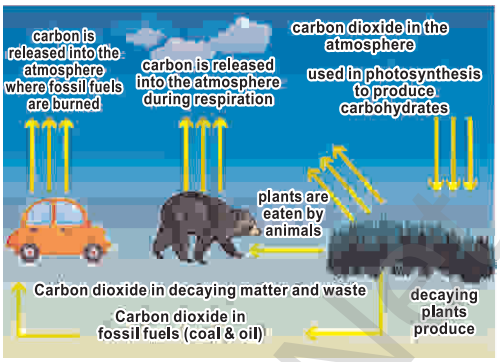
★ All living organisms are made up of carbon containing molecules like proteins and nucleic acids.

★ The atmospheric carbon dioxide enters into the plants through the process of photosynthesis to form carbohydrates.

★ From plants, it is passed on to herbivores and carnivores.

★ During respiration, plants and animals release carbon into atmosphere in the form of carbon dioxide.

★ Carbon dioxide is also returned to the atmosphere through decomposition of dead organic matter, burning fossil fuels and volcanic activities.



Carbon cycle

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3. List out the adaptations of xerophytes?

Ans : Adaptations of xerophytes :

1. Well developed roots which grow very deep and reach the layers where water is available.
E.g: Calotropis.
2. They store water in succulent water storing parenchymatous tissues.
E.g: Opuntia, Aloe vera.
3. They have small sized leaves with waxy coating.
E.g: Acacia.
4. In some plants, leaves are modified into spines.
E.g: Opuntia.
5.. Some of the xerophytes complete their life cycle within a very short period when sufficient moisture is available.

---

4. How does a bat adapt itself to its habitat ?

Ans : Adaptations of Bat :

★ Mostly, bats live in caves.

★ Apart from caves, bats also live in trees, hollowed logs and rock crevices.

Nocturnality :

★ Bats are active at night.

★ This is a useful adaptation for them, as flight requires a lot of energy during day.

★ Their thin, black wing membrane may cause excessive heat absorption during the day.

★ This may lead to dehydration.

Flight adaptation :

★ Forelimbs are modified serve wings.

★ Tail supports and controls movements during flight.

★ Muscles are well developed and highly powerful and achieve in beating of wings.

★ Tendons of hindlimbs provide a tight grasp when the animals are suspended upside down at rest.

Hibernation :

★ Hibernation is a state of inactivity in which the body temperature drops with a lowered metabolic rate during winter.

★ Bats are warm blooded animals but unlike other mammals, they let their internal temperature reduce when they are resting.

★ They go to a state of decreased activity to conserve energy.

PRACTICALS

PHYSICS

1. TO FIND THE DIAMETER OF A SPHERICAL BODY

Marks : 10
Time : 40 Minutes

Aim :

★ To determine the diameter of a spherical body using Vernier Caliper.

Apparatus required :

★ Vernier Caliper, given spherical body (cricket ball).

Formula :

i) Least count (LC) = 1 Main scale division - 1 Vernier scale division
LC = 1mm - 0.9mm
LC = 0.1mm (or) 0.01cm

ii) Diameter of the spherical object (d) = M.S.R. + (VC x LC) ± ZC cm

where, MSR = Main Scale Reading
VC = Vernier Coincide
LC = Least Count (0.01cm)
ZC = Zero Correction

Procedure :

★ Find the least count of the Vernier caliper.
★ Find the zero correction of the Vernier caliper.
★ Fix the object firmly in between the two lower jaws of the Vernier.
★ Measure the main scale reading and the Vernier scale Coincidence.
★ Repeat the experiment by placing the jaws of the Vernier at different position of the object.
★ Using the formula find the diameter of the object.

Least Count (LC) : 0.01cm Zero Correction (ZC) : 0

Sl.No	Main Scale Reading(MSR)cm	Vernier Coincidence(VC)	Diameter of object d = MSR + (VC x LC) ± ZC (cm)
1	7.2	9.5	7.2+ (9.5x0.01) = 7.2+0.095 = 7.295
2	7.2	9.4	7.2+ (9.4x0.01) = 7.2+ 0.094 = 7.294
3	7.2	9.6	7.2+ (9.6x0.01) = 7.2+ 0.096 = 7.296

Average $\frac{21.885}{3}$ = **7.295cm**

Result : The diameter of the given spherical object (Cricket ball) is **7.29** cm

Marks Allotment :

Aim	-	**1 Mark**
Apparatus required	-	**2 Marks**
Formula	-	**2 Marks**
Procedure	-	**2 Marks**
Tabulation	-	**2 Marks**
Result	-	**1 Mark**
Total	-	**10 Marks**

CHEMISTRY

4. MEASUREMENT OF VOLUME OF LIQUIDS

Marks : 10
Time : 40 Minutes

Aim :

★ To measure the volume of given colourless and coloured liquids.

Materials Required :

Pipette (20ml), sample liquids and beakers

Procedure :

Take a 20 ml pipette. Wash it thoroughly with water and then rinse it with the given liquid. Insert the lower end of the pipette into the given liquid and suck the solution slowly till the solution rises well above the circular mark on the stem. Take the pipette out of the mouth and quickly close it with the fore finger. Take the pipette out the liquid and keep it such a way that the circular mark on the stem is at the level of the eyes. Now slowly release the fore finger to let the liquid drop out until the lower meniscus touches the circular mark on the stem. If the liquid in the pipette is exactly 20ml. This can be transferred to an empty beaker by removing the fore finger.

Tabulation :

Sl.No	Name of the liquid	Colour of the liquid	Nature of the meniscus	Volume of the liquid
1	Pottassium permanganate	pink	Upper meniscus	20ml
2	Copper sulphate	Blue	Upper meniscus	20ml
3	Hydrochloric acid(HCl)	Colourless	Lower meniscus	20ml
4	NaOH solution	Colourless	Lower meniscus	20ml

Result : Exactly 20ml of various liquids are measured using a standard 20ml pipette.

Note :

1) Keeping the circular mark on the stem of the pipette above or below the level of the eyes will lead to error.

★2)When coloured liquids are measured, the upper meniscus should be taken into account.

★3)Never suck strong acids or strong alkalis using a pipette.

Marks Allotment :

Aim	-	**2 Marks**
Materials Required	-	**2 Marks**
Procedure	-	**2 Marks**
Tabulation	-	**2 Marks**
Result	-	**2 Marks**
Total	-	**10 Marks**

BIOLOGY

5. IDENTIFICATION OF ADAPTATIONS IN ANIMALS

Marks : 10
Time : 40 Minutes

Aim :

★ To identify the given vertebrate animal and list out the following adaptations seen in them.

Required Specimens :

1. Pisces (Fish), 2. Amphibian (Frog), 3. Reptile (Calotes), 4. Aves (Dove), 5. Mammal (Rat)

The following adaptations are noted.

Sl.No	Name of the animal	Habitat	Body structure	Body covering	Locomotory organs
1	Pisces(Fish)	Water	Streamlined body. Body has three parts- Head, trunk and tail.	Scales	Fins
2	Amphibian (Frog)	Both land and water	Body has head and trunk. No intervening neck.	Mucous glands	Fore and hind limbs.
3	Reptile (Calotes)	Land	Body has head, trunk and tail.	Dry scales	Fore and hind limbs.
4	Aves(Dove)	Towers, tree holes.	Body has head, neck, trunk and tail.	Feathers	Wings (modified fore limbs)
5	Mammal (Rat)	Holes	Body has head, neck and trunk.	Hairs	Fore and hind limbs.

Result : Comparitive study about the adaptation of the given specimen was done.

Marks Allotment :

Aim	-	**2 Marks**
Required Specimens	-	**2 Marks**
Observation	-	**2 Marks**
Result	-	**2 Marks**
Record Work	-	**2 Marks**
Total	-	**10 Marks**

8. IDENTIFICATION OF MICROBES

Aim:

★ To identify the different types of microbes (Bacteria and Virus).

Observation:

To observe and identify the following microbes with the help of photograph /picture / permanent slide using a compound microscope/model/biovisual chart.

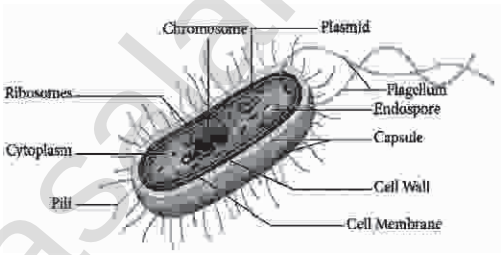
a) Escherichia coli
b) Vibrio cholerae
c) Lactobacillus
d) Retrovirus (HIV)

Answer the following:

a) Draw a neat labelled diagram.
b) Write the shape of the bacteria and virus observed.
c) Mention the structural details of the bacteria and virus.
d) Indicate its microbial importance/disease caused.

A) Escherichia coli : **a) Diagram**

The given photograph observed as Escherichia coli



b) Escherichia coli bacteria is Rodshapped.

c) Structure of the bacteria :

★ Bacterial cell has cell membrane covered by rigid cell wall made up of peptidoglycon.

★ Outside of the cell wall there is a slimy protective layer called capsule.

★ The plasma membrane encloses the cytoplasm, incipient nucleus (nucleoid), ribosomes and DNA which serves as genetic material.

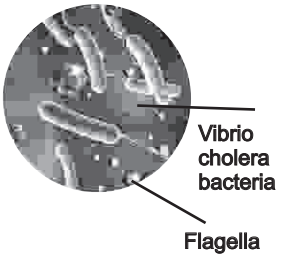
★ They lack membrane bound organelles.

★ A small extra chromosomal circular DNA called plasmid found in cytoplasm.

d) Microbial importance :

★ In genetic engineering, plasmid DNA segment of Escherichia coli act as a suitable carrier or vector for manipulation and cloning of human insulin genes.

B) Vibrio cholerae : **a) Diagram**



b) Shape of the Vibrio cholera : Comma shaped

c) Structure of the vibrio cholera bacteria:

(i) Vibrio cholera are rigid, curved rods that are actively motile by means of a polar flagellum.

(ii) They are short, curved cylindrical rod with rounded or slightly pointed ends.

d) Disease caused : Cholera (Acute disarrhoeal disease)

C) Lactobacillus: **a) Diagram**

b) Shape : Rod shaped (Bacillus)

c) Structure :

(i) Lactobacillus bacteria is Rod shaped possess cell membrane covered by cell wall.

(ii) Plasma membrane encloses cytoplasm, incipient nucleus.

(iii) It is facultative anaerobic ; growing on a nutrient medium.

d) Microbial importance:

Production of curd, Lactobacillus sp. converts milk to curd