SMART SKILLS

SYLLABUS 2016-2017

CHEMISTRY
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SYLLABUS – 2016-2017
CHEMISTRY
CLASS – X

Term – I

April-May

Chapter 1: Chemical reactions and equations

Types of chemical reactions: Combination, decomposition, displacement, double displacement, oxidation and reduction in terms of gain and loss of oxygen, corrosion, rancidity.

Activities:

To demonstrate different types of reactions in the class.

Practical

Experiment – 1
To perform and observe the following reactions and classify them into:

- Combination reaction
- Decomposition reaction
- Displacement reaction
- Double displacement reaction

(1) Action of water on quick lime.
(2) Action of heat on ferrous sulphate crystals.
(3) Iron nails kept in copper sulphate solution.
(4) Reaction between sodium sulphate and barium chloride solutions.

MCQ questions on practical skills
Chapter 2: Acids, bases and Salts

Understanding the chemical properties of acids and bases: how do acids and bases react with metals, how do metal carbonates and metal hydrogen carbonates react with acids, how do acids and bases react with each other, reaction of metallic oxides with acids, reaction of a non-metallic oxide with base, what happens to an acid or a base in a water solution.

pH, importance of pH in everyday life, chemicals from common salt, sodium hydroxide, bleaching powder, baking soda, washing soda, plaster of Paris.

Activities:
- Reaction of acids and bases with metal.
- Reaction of HCl with NaHCO₃ and Na₂CO₃.
- Neutralization reaction.
- Effect of acid and base on litmus paper.

Practical

Experiment – 3

To find the pH of the following samples:

(i) Dilute HCl solution
(ii) Dilute NaOH Solution
(iii) Dilute ethanoic acid solution
(iv) Lemon juice
(v) Water
(vi) Dilute sodium carbonate solution by using pH paper/ universal indicator.
Experiment – 4
To study the properties of acids (dil HCl) by their reactions with:
   (i) Litmus solution (Red/Blue)
   (ii) Zinc metal
   (iii) Sodium carbonate.

Experiment – 5
To study the properties of bases (dil NaOH sol) by their reactions with:
   (i) Litmus solution
   (ii) Zinc metal
   (iii) Solid sodium carbonate
   (iv) Phenolphthalein.

MCQ questions on practical skills

**August**

**Chapter 3: Metals and non-metals**

Physical properties of metals and non-metals, chemical properties of metal, reactivity series, properties of ionic compounds, various metallurgical processes, corrosion, prevention of corrosion.

Various metallurgical processes, corrosion, prevention of corrosion.

**Activities:**
- Reaction of metals with water.
- Rusting of iron.
- Reaction of Zn with CuSO₄.
Practical

Experiment – 6:
(a) To observe the action of Zinc, iron, copper and aluminium on the following salt solutions:
   (i) ZnSO₄ (aq)
   (ii) FeSO₄ (aq)
   (iii) CuSO₄ (aq)
   (iv) Al₂(SO₄)₃ (aq)
(b) Arrange Zn, Fe, Cu and Al in the decreasing order of reactivity based on the above result.

MCQ questions on practical skills

September

Chapter 14: Sources of energy

Conventional sources of energy: fossil fuels, thermal power plant, hydro power plant, biomass and wind energy.

TERM – II

October

Chapter 4: Carbon and its compounds

Nomenclature of carbon compounds, bonding in carbon- the covalent bond, versatile nature of carbon, saturated and unsaturated carbon compounds.

November - December

Chapter 4: Carbon and its compounds (Contd.)

Chains, branches and rings, homologous series, properties of alcohols and carboxylic acids, soap-cleansing action of soap.
**Practical**

**Experiment – 7**

To study the following properties of acetic acid:

(i) Colour
(ii) Solubility in water
(iii) Effect on litmus
(iv) Reaction with sodium carbonate

**Experiment – 8**

Preparation of soap using Castor oil and NaOH. Testing its behavior with hard and soft water and other properties.

**January**

**Chapter 5: Periodic classification of elements**

Need for classification of elements, Modern periodic table, position of elements in the modern periodic table, trends in the modern periodic table: valency, atomic size, metallic and non-metallic properties.

**Revision for term II**
DESIGN OF THE QUESTION PAPER (2017)

Time: -3- hrs

Max. Marks: 90

A. Weightage to Content/ Subject Units (FIRST TERM)

<table>
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<tr>
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<td>33</td>
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B. Weightage to Content/ Subject Units (SECOND TERM)

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<tr>
<td>2.</td>
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<td>3.</td>
<td>Natural Phenomena</td>
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### C. Weightage to Forms of Questions

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<tr>
<th>S. No.</th>
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<td>03</td>
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<td>2.</td>
<td>Short answer type (SA I)</td>
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<td>03</td>
<td>06</td>
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<tr>
<td>3.</td>
<td>Short answer type (SA II)</td>
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<td>Long answer type (SA II)</td>
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<td>PRACTICAL based Questions</td>
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<td></td>
<td></td>
<td>02</td>
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<td></td>
<td>Total PRACTICAL based questions</td>
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The question paper will also include a section on OPEN TEXT BASED ASSESSMENT (questions of 7 mks each from the syllabus --- a total of 14 marks) in SA II. The case studies will be supplied to students in advance. These case studies are designed to test the analytical and higher order thinking skills of students.

### E. Scheme of Options

There will be no overall choice. However, there is an internal choice in every question of five marks category.

### F. Weightage to Difficulty Typology of Questions

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<thead>
<tr>
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<th>Percentage</th>
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FORMATIVE ASSESSMENT TERM I

(A) **Worksheet in class:** Make a list of possible reactions from the given set of compounds.

Rubric:

(i) No. of equations created: 5
(ii) No. of equations balanced: 5

(B) **Hands On Experiments:**

(a) Observation of following and classifying into kind of reaction

(i) Action of water on Quick lime
(ii) Action of heat on FeSO₄ crystals
(iii) Iron nails kept in CuSO₄ solution.
(iv) Reaction between Na₂SO₄ and BaCl₂ solutions

(b) Finding pH of Dil. HCl solution, Dil. NaOH solution, Dil. Ethanoic acid solution, lemon juice, water, dil. Sodium carbonate solution

(c) Study the reaction of dil. HCl with litmus solution (Red/ Blue), Zinc metal, Sodium carbonate

(d) Study the properties of bases with litmus solution, zinc metal, sodium carbonate, phenolphthalein.

(e) Observing the action of Zn, Fe, Cu and Al on ZnSO₄, FeSO₄, CuSO₄ and Al₂(SO₄)₃ solutions. Based on these, arrange the metals in the reactivity series.

Rubric:

(i) Aim 1
(ii) Apparatus 1
(iii) Theory and diagram 2
(iv) Observation and performing skills 4
(v) Inference drawn 1
(vi) Precautions 1
FORMATIVE ASSESSMENT TERM II

(A) Hands on Experiment:

To study the following properties of acetic acid:

(i) Colour
(ii) Solubility in water
(iii) Effect on litmus
(iv) Reaction with sodium carbonate

Rubric (10 marks):

(i) Aim 1
(ii) Apparatus 1
(iii) Theory and Diagram 2
(iv) Observation and performing skills 4
(v) Inference drawn 1
(vi) Precautions 1

(B) PROJECT WORK IN SCHOOL:

(I) Preparation of soap
(II) Study of prepared soap on following parameters

(i) Lather formation with hard and soft water and its comparison.
(ii) Lather formation with acid solution
(iii) Finding pH, reporting the nature
(iv) Action on litmus
(v) Action of Phenolphthalein
(vi) Action on natural indicators eg. turmeric

Rubric (10 marks):

Soap Preparation: 4

Reporting the observations made: 6
Chapter No. 1

Chemical Reactions and equations (I)

(Multiple choice questions)

Q1. A solution of a substance in water is denoted by-
   1) (l)  2) (s)  3) (aq)  4) (w)

Q2. $x \text{MnO}_2 (s) + y \text{HCl} \rightarrow z \text{MnCl}_2 + w \text{Cl}_2 + r \text{H}_2\text{O}$. What are $x$, $y$, $w$, $r$ and $z$ respectively?
   1) 1, 2, 3, 4  2) 1,4,1,2,1  3) 3, 4, 1, 4  4) 3, 3, 3, 3

Q3. $2 \text{HCl} + \text{Zn} \rightarrow \text{ZnCl}_2 + \text{H}_2$ is an example of ------------ reaction.
   1) Oxidation  2) Reduction  3) Combination  4) Displacement

Q4. Which of the following metals do not corrode in moist air?
   1) Copper  2) Iron  3) Gold  4) Silver

Q5. A decomposition reaction brought about by electricity
   1) Thermolysis  2) Photolysis  3) Electrolysis  4) Pyrolysis

Q6. What happens when dilute hydrochloric acid is added to iron fillings?
   1) Hydrogen gas and iron chloride is produced.
   2) Chlorine gas and iron hydroxide are produced.
   3) No reaction takes place.
   4) Iron salt and water are produced.
Q7 Oxidation of fatty substances in food is prevented by
   1) Galvanisation
   2) Electroplating
   3) Antioxidants
   4) Oxidation

Q8 An iron nail is kept immersed in a solution of copper sulphate for three hours. When it was
   taken out of the copper sulphate solution, it was found to acquire a brown colour. This
   brown colour is
   1. due to the rusting of the iron nail.
   2. oxidation of iron due to iron oxide.
   3. due to deposition of copper metal on iron nail.
   4. due to conversion of iron to iron sulphate.

Q9 $\text{Fe}_2\text{O}_3 (s) + \text{Al} (s) \rightarrow 2\text{Fe} (s) + \text{Al}_2\text{O}_3 (s)$ . This reaction is an example of
   1) combination reaction
   2) double decomposition reaction
   3) decomposition reaction
   4) displacement reaction

Q10 Statement 1: Respiration is an exothermic process.
   Statement 2: $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
   1) Both statements 1 and 2 are true, statement 2 is correct explanation for statement 1.
   2) Both statements 1 and 2 are true, statement 2 is not correct explanation for
      statement 1.
   3) Statement 1 is true and statement 2 is false.
   4) Statement 1 is false and statement 2 is true.
Chapter No- 1
Chemical Reactions And Equations ( II )

Assignment

Q1. Explain Thermal Decomposition and Photolytic decomposition reactions with example.

Q2. Use step wise balancing method to balance the following equation:
   \[ \text{Fe}_2\text{O}_3 + \text{Al} \rightarrow \text{Al}_2\text{O}_3 + \text{Fe} \]

Q3. What happens
   i) when quicklime is added to water?
   ii) Zinc metal is dipped in copper sulphate solution.

Q4. Translate the following into balanced chemical equations:
   1) Steam is passed over heated iron to form magnetic oxide of iron (\(\text{Fe}_3\text{O}_4\)) and hydrogen.
   2) Carbon disulphide burns in air to give carbon dioxide and sulphurdioxide.
   3) Magnesium burns in presence of Nitrogen to form Magnesium nitride.

Q5. With the help of an activity show the displacement reaction of zinc granules and dilute hydrochloric acid.

Q6. What type of reaction takes place when copper powder is heated in oxygen. Write chemical reaction for it.

Q7. A metal is treated with dilute sulphuric acid. The gas evolved is collected by the method shown in the figure. Answer the following
   (i) Name the gas.
   (ii) Name the method of collection of the gas.
   (iii) Is the gas soluble or insoluble in the water?
   (iv) Is the gas lighter or heavier than air?
Vegetable battery

Introduction

In this activity, you will learn how to build a battery from potatoes. Along the way, you will answer the following questions:

1. How does a battery work?
2. What is current?
3. What is voltage?
4. What happens when you put two batteries in series?
5. What happens when you put two batteries in parallel?

You will then use what you have learned to design a potato battery to light two LEDs (Light Emitting Diodes). I will tell you now, the two LEDs need 1.6 volts and 2 milliamps. What does that mean?! You will find out...

Background

The battery was invented around 1800 by Alessandro Volta in Italy. It has become an indispensable part of modern life. Wherever you look, you will find devices that use batteries.

Why are batteries so useful? Because they convert chemical energy into electrical energy. You can use this electrical energy to light a flashlight, to start a car, or to listen to your favorite music.

You can make a simple battery by placing a zinc strip and a copper strip in an acid. At the zinc strip, the acid dissolves the zinc freeing electrons. At the copper strip, the acid uses those electrons to form hydrogen gas. Because the zinc strip frees electrons and the copper strip uses electrons, if you put a wire between the two strips, then electrons will flow from the zinc to the copper. This is electrical energy.

Pre-Activity

Done before the class as an introduction to batteries and the chemical reactions going on.

Need two 500 mL beakers, vinegar, 2 copper strips, 2 zinc strips, and low current LED.

Hook up the beakers and strips as 2 batteries in series and attach the LED. Half fill the beakers with water. Show that the LED is dimly lit. Add vinegar, representing free protons, to the beakers and show that the LED is now brightly lit.
Smart Skills

Materials

- metal strips: copper, aluminum, zinc (galvanized steel)
- potatoes (at least 4)
- multimeter (volts, milliamps)
- wire clips
- steel wool (to clean the metal strips)

Simple Potato Battery

1. Select two different metal strips and one potato.
2. Carefully place the metal strips into the potato.

Congratulations! You have just made a battery! Simple, yes? Now you will learn about your battery. At this point, you may be wondering: What is the acid in the potato? What is causing a chemical reaction? The explanation is:

1. the potato has a mild phosphoric acid content $H_3PO_4$
2. reduction at Cu (copper) electrode:
   
   $2H^+ + 2e^- \rightarrow H_2 \text{ gas}$
3. oxidation at Zn (zinc) electrode:
   
   $Zn \rightarrow Zn^{++} + 2e^-$

The $H_3PO_4$ acid puts the hydrogen ions in solution.

So basically, the phosphoric acid in the potato acts like the acetic acid (vinegar) that we used in the pre-activity.

Notes

- The best combination of metals should be copper and zinc.
- The LEDs used here are special low current LEDs, rated for 1.8 V and 1 mA, but they will fire at about 1.6 V and .2 mA.
• The zinc used here is really galvanized steel, meaning zinc coated steel. Zinc is dissolved from the strips in the battery, so the metal strips have a finite lifetime.
• Do not eat the potatoes afterwards!
Chapter No- 2

Acids, bases and salts (I)

(Multiple choice questions)

Q1. Which amongst the following can be used as an antacid ?
   1) Vinegar
   2) Milk of magnesia
   3) Calcium hydroxide
   4) Sodium hydroxide

Q2. Tooth decay starts when the pH of the mouth is lower than
   1) 10
   2) 8
   3) 7
   4) 5.5

Q3. When a base is dissolved in water
   1) concentration of OH− ions per unit volume increases.
   2) concentration of OH− ions per unit volume decreases.
   3) concentration of OH− ions per unit volume may increase or decrease depending upon the nature of the base.
   4) no change in concentration of OH− ions per unit volume occurs.

Q4. A remedy for acidity is
   1) lemon juice
   2) vinegar
   3) clove oil
   4) baking soda solution

Q5. The sting of ants and bees contains
   1) formic acid
   2) acetic acid
   3) slaked lime
   4) sodium hydroxide
Q6. The oxides of metals are
1) neutral 2) basic 3) acidic 4) none of these.

Q7. Large deposits of sodium chloride in the form of brown crystals is called
1) salt petre 2) alum 3) soda 4) rock salt

Q8. The acid produced in stomach is
1) HCl 2) H₂SO₄ 3) HNO₃ 4) CH₃COOH

Q9. Solutions A, B, C and D have pH 3, 4, 6 and 8. The solution with highest acidic strength is
1) A 2) B 3) C 4) D

Q10. Methyl orange is
1) Yellow in acidic medium and red in basic medium
2) Red in acidic medium and yellow in basic medium
3) Colourless in acidic medium and red in basic medium
4) Red in acidic medium and Colourless in basic medium
Chapter No- 2
Acids, bases and salts (II)

Assignment

Q1. Write any three chemical properties of acids. (Give the reactions involved)

Q2. Crystals of a substance changed their colour on heating in a closed vessel but regained it after some time when they were allowed to cool down. Name one such substance and explain the phenomenon involved.

Q3. Identify the compound of calcium which is yellowish white powder and is used for disinfecting drinking water. How it is manufactured? Write chemical equations for the reactions involved. What happens when it is left exposed to air?

Q4. With the help of an activity show that hydrochloric acid solution conducts electric current.

Q5. Demonstrate by an experiment that acid reacts with metal carbonate to liberate carbon dioxide.

Q6. Give reasons;
   a) Acid must be added to water and not vice versa during dilution.
   b) Solution of sulphuric acid conducts electricity whereas alcohol does not.
   c) Cake rises on adding baking powder.
   d) Dry ammonia gas has no action on litmus paper, but a solution of ammonia in water turns red litmus blue.
   e) Tartaric acid is an important ingredient of baking powder.

Q7. Identify the compound of calcium which is used for plastering of fractured bones. With the help of chemical equation show how it is prepared. What special precautions should be taken during the preparation of this compound?
Q8. Write balanced equations for the following reactions:
   1) Dilute sulphuric acid reacts with aluminium powder.
   2) Dilute hydrochloric acid reacts with iron fillings.
   3) Dilute sulphuric acid is added to solid sodium carbonate.

Q9. Baking soda is used in small amount in making bread and cake. It helps to make these soft and spongy. An aqueous solution of baking soda turns red litmus blue. It is also used in soda-acid fire extinguisher.
   1) How does baking soda helps to make cakes and bread soft and spongy?
   2) How does it help in extinguishing fire?
   3) Is the pH of baking soda solution less than or greater than 7.

Q10. Write balanced equations for the preparation of the following salts -
   1) NaNO₃
   2) K₂SO₄
   3) Al(NO₃)₃
**FUN WITH CHEMISTRY**

**Make Sloppy Slime**
Slime that can’t make up its mind – one minute it’s oozing like a liquid, the next it’s acting like a tough solid.
Steps:
1. Pour some corn flour in the bowl.
2. Add a little of the food colouring to the water. (Food colouring can stain so be very careful).
3. Slowly stir in some of the coloured water in with the corn flour (adding a few drops at a time).
4. Continue to stir with the wooden until it starts to thicken to a paste. You may find that you need to add more water or corn flour to get the right mix.
5. Take a handful and watch it ooze out of your hand. It flows like a slippery liquid.
6. Squeeze the slime and it becomes a solid.
THIS EXPERIMENT CAN BE VERY MESSY, SO PLEASE TAKE CARE AND BE PREPARED!!!

**Rocket Cola**
**Materials you will need:**
- Outside access
- Packet of Mint Mentos
- 2 Litre Bottle of Diet Coke
This is a very messy experiment so it really does need to be conducted outside on a nice day. Do not do this experiment inside.
Steps:
1.) Place the 2L bottle of Diet Coke on a flat surface and in a secure place outside.
2.) Remove the lid from the bottle of Diet Coke.
3.) Remove 4 mentos from the packet and get ready to drop all four of them into the bottle of Diet Coke as quickly as possible and jump back out of the way of the shooting rocket.
It is amazing how quickly the mentos react with the Diet Coke and the amount of pressure build up that is released by spewing the cola into the sky.
Try doing this experiment with a smaller cola bottle and dropping in two mintos.
Another way is to do this experiment is to get an adult to put a small hole in the lid so that the
cola can shoot out the top of the hole. If you try this experiment use peppermint lifesavers,
extra strong mints or polo mints. Drop the mint in, screw the lid back on the bottle, shake it and
hold it at an angle pointing away from you. Shake the cola bottle a few more times to see how
many time you can get it to rocket out of the bottle.

**Surface Tension Experiment**

**Materials you will need:**

- Water
- A Bowl
- Liquid Dish Soap
- Wooden Matchsticks

**Steps:**

1. Fill a bowl with water and place a few matchsticks on the water.
2. Drop in a small amount of dish soap into the centre of the bowl and watch the matches shoot
   across the surface of the water like power boats.

It works because the soap gives off an oily film that rushes outwards, breaking down the
surface tension of the water and pushing the matches away.

**Bobbing Raisins**

**Materials you will need:**

- A Clear Glass/Jar
- Carbonated Drink (Clear)
- A Handful (4-6) of Raisins

**Steps:**

1. Pour the carbonated drink into the glass/jar.
2. Drop the raisins into the glass/jar.

What to see what happens to the raisins!!!
The bobbing up and down works because the bubbles of carbon dioxide gas in the drink are much less dense than the drink or the raisins.

Once the raisins start bobbing up and down, they will continue to rise and fall for about an hour.

- Raisins are denser than the carbonated drink, so they will sink.
- Gas bubbles attach to the wrinkles on the raisins.
- When the raisins are covered with the bubbles they become less dense than the drink, so they start to rise.
- The gas bubbles start bursting and then the raisins become denser than the drink, so they sink again.
Chapter No. 3
Metals and Non Metals (I)
(Multiple choice questions)

Q1. Which of the following metal forms amphoteric oxides?
    1) Copper
    2) Silver
    3) Aluminium
    4) Iron

Q2. Aqua regia is a mixture of
    1) HNO₃ and HCl in the ratio of 1:3 by volume
    2) HNO₃ and HCl in the ratio of 3:1 by volume
    3) HNO₃ and HCl in the ratio of 1:1 by volume
    4) H₂SO₄ and HCl in the ratio of 1:3 by volume

Q3. Rust is hydrated
    1) Aluminium oxide
    2) Iron oxide
    3) Silica
    4) Copper oxide

Q4. Which of the following metals is protected from oxygen and moisture by immersing in kerosene oil?
    1) Potassium
    2) Aluminium
    3) Magnesium
    4) silver

Q5. Which of the following metal will not displace H₂ gas from dilute H₂SO₄
    1) zinc
    2) iron
    3) copper
    4) aluminium
Q6. Among the metals poorest conductor of heat is
1) Lead
2) Tin
3) Bismuth
4) Mercury

Q7. The common method for the extraction of metals from the oxide ore is
1) Reduction with carbon
2) Electrolytic method
3) Reduction with aluminium
4) All of these

Q8. The best conductor of electricity is
1) Copper
2) Aluminium
3) Silver
4) All are equal

Q9. Stainless steel in addition to iron contains
1) nickel and chromium
2) copper and tin
3) aluminium and magnesium
4) carbon and manganese

Q10. Which of the following oxide cannot be reduced with carbon to obtain metal?
1) MnO₂
2) Cr₂O₃
3) Al₂O₃
4) All of these
Chapter No- 3
Metals and Non-Metals (II)

Assignment

Q1. An element on burning in air forms an oxide XO₂ which when dissolved in water turns blue litmus red. Identify if 'x' is a metal or a non metal. Justify your answer.

Q2. Name the reducing agent in the reaction

\[ 3\text{MnO}_2 + 4\text{Al} \rightarrow 3\text{Mn} + 2\text{Al}_2\text{O}_3 \]

For the reduction of metal oxide to metal, suggest a reducing agent cheaper than aluminium

Q3. Give reason:
   (i) Metals are regarded as electropositive metals.
   (ii) Aluminium which is more reactive than iron does not corrode like iron.
   (iii) When a piece of copper metal is added to a solution of zinc sulphate, no change takes place, but the blue colour of copper sulphate fades away when a piece of zinc is placed in its solution.
   (iv) Aluminium cannot be extracted by using carbon as a reducing agent.
   (v) Ionic compounds in in solid state do not conduct electricity and they do so in molten state.

Q4. With the help of an activity show that metals are good conductors of heat.

Q5. Describe with the help of a labeled diagram the method of refining of copper by electrolytic method

Q6. Design an experiment to show that both air and water is needed for rusting.

Q7. An ore on heating in the absence of air gives carbon dioxide. Which method will you use to convert the ore into oxide form? Explain.

Q8. What are amphoteric oxides? Choose the amphoteric oxides from amongst the following oxides;

\[ \text{Na}_2\text{O}, \text{ZnO}, \text{Al}_2\text{O}_3, \text{CO}_2, \text{H}_2\text{O}. \]

Q9. What are alloys? What properties of alloys make it useful over pure metals. Explain with examples.
Q10. Show the formation of Na\(_2\)O by the transfer of electrons between the combining atoms.

**Amazing Facts about gold**

The Istana Nurul Iman palace domes are made of gold-leaf. It is the official residence of the Sultan of Brunei, Hassanal Bolkiah.

Gold is the most malleable and ductile metal; a single gram can be beaten into a sheet of one square meter, or an ounce into 300 square feet.

**Uses of Gold**

1. Gold is the most popular metal used in jewelry making. Here are some other uses of this precious metal.
2. McLaren F1 uses gold foil in the engine compartment
3. Gold is used in astronauts’ helmets
4. Gold can be used in food. Goldwater, traditional herbal liquor produced in Poland and Germany, contains flakes of gold leaf. There are also some expensive ($1000) cocktails which contain flakes of gold leaf.
5. Gold is used in the connectors of expensive electronics cables, like audio, video and USB cables
6. Gold is used in computers, communications equipment, spacecraft, and jet aircraft engines
7. Colloidal gold (also known as “nanogold”, is a suspension (or colloid) of sub-micrometre-sized particles of gold in a fluid – usually water) is used in research applications in medicine, biology and materials science. Colloidal gold is also the form of gold used as gold paint on ceramics prior to firing.
8. It is used for the protective coatings on many artificial satellites
9. It is used in infrared protective faceplates in thermal protection suits
10. It is used in electronic warfare planes like the EA-6B Prowler
11. Gold is used as the reflective layer on some high-end CDs
12. The isotope gold-198 is used in some cancer treatments and for treating other diseases
13. Gold leaf, flake or dust is used on and in some gourmet foodstuffs, notably sweets and drinks as decorative ingredient
14. Gold alloys are used in restorative dentistry, especially in tooth restorations, such as crowns and permanent bridges
15. Gold can be made into thread and used in embroidery

ENJOY THE CROSSWORD

Across Clues

1. One characteristic of metals is that they have?
4. The type of element that is a poor conductors of heat and electricity
5. I have 26 protons
6. I am a list of all known elements
8. The number of valence electrons that boron has?
9. I am the element in period 2, group 18
10. I am a metalloid
13. The type of elements that have characteristics of both metals and nonmetals
14. I am a gas with 8 protons

Down Clues

2. Salt forming elements are also know as?
3. The periodic table is not based on:
6. I am a horizontal row
7. What are group one elements known as?
11. I am a metal and a liquid at room temperature.
12. The vocabulary term used that states: Can be stretched into wire
Sources of energy (conventional sources)

Q1. Firewood is our conventional fuel. List any four reasons for replacing it by the alternate sources of energy.

Q2. Name the process for obtaining charcoal from wood. What are the advantages and disadvantages of burning charcoal over wood?

Q3. Why are fossil fuels called non-renewable sources of energy?

Q4. How can you minimize pollution caused by burning fossil fuels?

Q5. Distinguish between renewable and non-renewable sources of energy.

Q6. Explain how a thermal power plant produces electricity.

Q7. Mention advantages and disadvantages of producing hydroelectricity by building dams on river.

Q8. Describe the steps involved in obtaining biogas and explain what is meant by anaerobic decomposition.

Q9. Give the limitations of wind energy.

Q10. Name the different constituents of bio gas. Why is biogas a better fuel than animal dung cakes?
Revision Assignment – Term I

Chapter No. 1

Chemical Reactions and equations

Q1. Write the balanced chemical equations for the following chemical reactions.
   a) Aqueous solution of sulphuric acid reacts with sodium hydroxide to form aqueous sodium sulphate and water.
   b) Phosphorous burns in chlorine gas to form phosphorous pentachloride.

Q2. Identify the substance oxidized and substance reduced in the following reactions-
   1) ZnO + C → Zn + CO
   2) MnO₂(s) + 4HCl (aq) → MnCl₂(s) + 2H₂O(l) + Cl₂ (g)
   3) Cu(s) + 2 AgNO₃(aq) → Cu(NO₃)₂(aq) + 2Ag(s)

Q3. Balance the following equations :-
   i) Al + HCl → AlCl₃+ H₂
   ii) KMnO₄ → K₂MnO₄ + MnO₂ + O₂

Q4. Suggest methods which can be used to prevent food from getting rancid.

Q5. What types of reactions are represented by the following equations :-
   1) A + B^{2+} → A^{2+} + B
   2) A + BC → AC + B
   3) A → B + C
   4) A + B → AB
   5) AB + CD → AD + CB

Q6. When the solutions of lead (II) nitrate and potassium iodide are mixed, what type of reaction occurs? Write balanced equation for this reaction.

Q7. Give an example of decomposition reaction carried out with the help of electricity.

Q8. Name the products obtained on strong heating of lead nitrate. Write chemical equation for the reaction. What type of chemical reaction occurs in the change?

Q9. Which of the following reactions are possible and why?
   i) Cu (s) + 2 AgNO₃ (aq) → Cu (NO₃)₂ (aq) + 2Ag(s)
   ii) Cu(s) + ZnSO₄ (aq) → Zn(s) + CuSO₄(aq)

Q10. What is corrosion? List two methods which can prevent the corrosion of metals.
Chapter No- 2

Acids, bases and salts

Q1. What is an acid base indicator? Give two examples of synthetic acid base indicators.

Q2. A gas produced in the lab is highly soluble in water. Its colourless solution turns pink on adding few drops of indicator. Name the indicator and the nature of this gas?

Q3. How is plaster of Paris obtained from gypsum? Give chemical reaction. Plaster of paris should be stored in moisture proof container. Explain why.

Q4. What happens when electricity is passed through brine? Give reaction.

Q5. ‘Sweet tooth’ may lead to tooth decay. Explain why? What is the role of tooth paste in preventing cavities?

Q6. A compound “X” of sodium is used to in kitchen for making crispy pakoras. It is also used for curing acidity in the stomach. Identify ‘X’. What is its chemical formula? State the reactions that take place when it is heated on cooking.

Q7. There are some substances which give different odour in different medium.
   a) What is the name given to such substances?
   b) Give an example of such substance.

Q8. Why is plaster of Paris written as CaSO$_4$.1/2 H$_2$O? How is it possible to have half a molecule of water attached to CaSO$_4$.

Q9. Black colour of copper oxide changes to bluish green if reacted with dilute hydrochloric acid. Why?

Q10. A white powder is used for decolorizing wood pulp in paper industry.
   a) Give its chemical name and formula.
   b) Give the chemical equation to show its preparation.
Chapter No. 3

Metals and Non Metals

Q1. Write the chemical equation for the reaction of hot aluminium with steam.

Q2. Holes are observed in zinc plate immersed in copper sulphate solution. Explain why?
Q3. State two properties of carbon which are not expected from its classification as Non-metal.
Q4. What happens when basic oxides like Na₂O or K₂O is dissolved in water? Write the balanced chemical reactions.
Q5. What do you understand by thermite reaction?
Q6. Which is more metallic Sodium or Aluminium? Why?
Q7. Give reasons for the following:
   1) Hydrogen is not metal but it has been assigned a place in the activity series of Metals.
   2) Aluminium is found in combined state whereas gold is found free in nature.
   3) An alloy solder is used for soldering wires.
   4) Electric wires are coated with polyvinyl chloride.
Q8. A metal is found in nature as its carbonate ore. It is used in galvanization of iron articles. Identify the metal M and name its ore, MCO₃. How will you convert this carbonate ore into free metal? Explain with equations.
Q9. Out of copper and iron, which one is more reactive? How can you test it?

Q10. Silver metal does not combine with oxygen easily but silver jewellery tarnishes after some time. Why?
PRACTICE QUESTIONS – TERM I

Q1. What happens when limestone reacts with dil. HCl.

Q2. Name two synthetic indicators which are used to test acids and bases.

Q3. What are strong acids? Give two examples.

Q4. What happens when HCl reacts with ammonium hydroxide? Give chemical equation for the reaction.

Q5. Do alkalis also react with metals? Give any two examples.

Q6. Which acid and base can be used to prepare sodium bicarbonate and sodium hydrogen sulphate?

Q7. On eating spicy food we feel burning sensation in our stomach, why? Which medicine will you take as a remedy?

Q8. When concentrated acid is diluted does the pH get higher or lower? Give reason.

Q9. How are acids and bases similar?

Q10. Name one chemical used to remove permanent hardness of water.

Q11. What is the role of tartaric acid in baking powder?

Q12. How is plaster of Paris obtained? Give a chemical equation.

Q13. What happens when electricity is passed through an aqueous solution of sodium chloride?

Q14. Why does blue vitriol loses its colour on heating? Write the reaction also.
Value – based questions :

Q1. There are different types of chemical reactions occurring around us or being carried out for the benefit of mankind e.g., combination reactions, decomposition reactions, displacement reactions, precipitation reactions, neutralization reaction etc.

Now, answer the following questions:

1) Combustion of coke is a combination reaction. CO$_2$ is not a pollutant. Then why is combustion of coke harmful?

2) Which decomposition reaction followed by two combination reactions are involved in whitewash of walls?

3) What value has been added to our lives by electroplating? Give two examples

Q2. The three important acids called mineral acids are sulphuric acid, nitric acid and hydrochloric acid. They find wide application in different industries like fertiliser, textile, leather industry etc. At home, their use for cleaning toilets is very common. However in recent times, bad elements in society are misusing these acids for example incidents of acid throwing on faces, thereby causing burns on the face are being reported. Balloons filled with acids are thrown on passers-by on Holi. A mixture of hydrochloric acid and nitric acid (called aqua regia) is being used to cheat women in the name of cleaning their gold jewellery.

Now answer the following questions:

i) What steps should be taken to stop the incidents of acid throwing.

ii) What should be done to check the miscreants from cheating the women of their jewellery cleaning?

iii) How do you think that the use of acid balloons on Holi festivals can be stopped?

Q3. Metals possess such properties which make them useful for number of purposes, e.g., in making jewellery, cons, electrical wires, heating pans etc. The nature of metals used depends upon the type of requirement.

Now answer the following questions:

i) Give two reasons for why gold is used in making jewellery?

ii) If you have to choose between copper and aluminium wires for transmission of electricity, which one will you prefer and why?

iii) If you have to choose between silver and copper vessels for heating, which one will you prefer and why?

iv) Silver foils are often used in decorating sweets, how do they harm us?
TERM II
Chapter No. 4
Carbon and Its Compounds (I)
(Multiple choice questions)

Q1. Detergents are sodium or potassium salts of long chain
   1) Aldehydes
   2) Ketones
   3) Carboxylic acids
   4) Sulphonic acids

Q2. Which of the following compounds have a triple bond?
   1) C$_2$H$_6$
   2) C$_3$H$_6$
   3) C$_3$H$_4$
   4) C$_3$H$_6$

Q3. The difference in the formula and molecular masses of CH$_3$OH and C$_2$H$_5$OH is
   1) CH$_3$ and 16u
   2) CH$_2$ and 14u
   3) CH$_4$ and 18u
   4) CH$_3$ and 16u

Q4. The number of covalent bonds in C$_4$H$_{10}$ is
   1) 10
   2) 8
   3) 13
   4) 12

Q5. Which of the following is added to denature ethanol?
   1) Methanol
   2) Pyridine
   3) Copper sulphate
   4) All of these
Q6. Ethene is produced when
   1) Ethanol reacts with ethanoic acid in the presence of a few drops of conc. H₂SO₄
   2) Ethanol is oxidized with acidified potassium dichromate
   3) Ethanol is heated with excess of conc. H₂SO₄ at 443K
   4) Ethanol reacts with Na metal

Q7. The difference between molecular mass of any two adjacent homologues is--------
   1) 14 u   3) 16 u
   2) 12 u   4) 3 u

Q8. The general formula of alcohols is
   1) CₙH₂n+₂
   2) CₙH₂n+₁OH
   3) CₙH₂n
   4) CₙH₂n+₂COOH

Q9. The allotrope of carbon containing 60 carbon atoms is
   1) fullerene
   2) graphite
   3) diamond
   4) coal
Chapter No. 4
Carbon and Its Compounds (II)

C.W. ASSIGNMENT

Answer the following

Give the molecular formula and IUPAC names of the following organic compounds:

a) An alkyne containing 3 carbon atoms

____________________________________________________________________
____________________________________________________________________

b) An alcohol containing 5 carbon atoms

____________________________________________________________________
____________________________________________________________________

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c) An aldehyde containing 3 carbon atoms

____________________________________________________________________
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d) Simplest ketone

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e) An alcohol used in cough syrups.

____________________________________________________________________
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f) A carboxylic acid used as a preservative.

____________________________________________________________________
____________________________________________________________________

____________________________________________________________________

____________________________________________________________________
g) A saturated hydrocarbon containing 4 carbon atoms.


h) A cycloalkane containing 3 carbon atoms.


i) An aromatic compound.


Chapter No. 4
Carbon and Its Compounds (III)

Assignment

Q1. a) Complete the following reactions / chemical equations and name the main product formed in each case-

(i) CH₃COOH + C₂H₅OH →
   acid
   conc. H₂SO₄

(ii) C₂H₅OH → Heat (443 K)

Also state the importance of conc. H₂SO₄ in this reaction.

b) List two reasons why carbon forms large number of compounds and are poor conductors of electricity?

Q2. Explain with the help of chemical equation, what happens when sodium hydrogen carbonate reacts with ethanoic acid.

Q4. What is meant by denatured alcohol? What is the need to denature alcohol?

Q5. Name the groups of compounds with the following functional groups
   —CHO, —CO, —OH, —COOH

Q6. Give one example each for the following reactions:
   a. Dehydration
   b. Oxidation of alcohols
   c. Combustion
   d. Saponification
   e. Esterification

Q7. Complete and balance the following reactions:

(i) CH₃CH₂OH + Na →

(ii) CH₃COOC₂H₅ + NaOH →
   Hot conc. H₂SO₄

(iii) CH₃CH₂OH →
   conc. H₂SO₄

(iv) CH₃COOH + C₂H₅OH →

(v) CH₃COOH + Na₂CO₃ →
Q8. Show the bond formation in:

(i) Nitrogen gas
(ii) Methane
(iii) Ethanol


Q10. Write down the possible structural isomers for hexane. Also write their IUPAC names.

Q11. Write the name and formula of the 2nd member of homologous series having general formula C\textsubscript{n}H\textsubscript{2n}.

Q12. With the help of an example, explain the process of hydrogenation. Mention the essential conditions for the reaction and state the change in physical property with the formation of product.

Q13. What is the difference between the molecules of soaps and detergents, chemically? Explain the cleansing action of soaps.

Q14. Explain why carbon forms compounds mainly by covalent bond. Why does carbon form strong bonds with other elements?

Q15. List two tests for experimentally distinguishing between an alcohol and a carboxylic acid and describe how these tests are performed.
A few facts about carbon fibre

Carbon fibre is a lightweight yet strong substance. Many things from sports equipment like golf clubs and tennis racquets to sports cars use carbon fibre. Carbon fibre is easily identifiable by its unique chequered appearance.

What is carbon fibre?

Carbon fibre is a material that is made from very thin fibres having carbon atoms. These are bonded together in microscopic crystals, aligned parallel to the long axis of the fibre. It is this crystal alignment that makes carbon fibre so strong. Carbon fibre is used to make composite materials with plastics resins. Carbon fibre has the strength of steel, yet is lightweight. It also does not expand when heated due to its high heat resistance. When stretched or bent, carbon fibre is very strong, but if you subject it to high shock or compression, such as hitting it with a hammer it will break. Carbon fibre has the best weight to strength ratio.

The first carbon fibres

You might be surprised to know that carbon fibre is by no means a recent discovery.
1. Thomas Edison used carbon fibre filaments in his early light bulb experiments back in 1879. He created these fibres by heating bamboo in a controlled environment. The carbon fibre Edison carbon made was from cellulose-based materials, today it is made from petroleum bases. The carbon fibres that Edison made out of the bamboo fires were fire resistant, making it ideal for his filament for incandescence.

The carbon fibres that Edison made out of the bamboo fires were fire resistant, making it ideal for his filament for incandescence.

2. Later in 1958 Roger Bacon would try to make carbon fibres from strands of rayon but these fibres were not very strong. It was only later in 1963 that the Royal Aircraft Establishment at Famborough, Hampshire UK developed strong carbon fibre. Rolls Royce used this in their aeroplane engines.

3. Today carbon fibre is made from the polymer PAN. Once this polymer is produced it is stretched in a manner that it becomes parallel to the axis of the fibre. This polymer is then oxidised at a temperature of 200°C to 300°C to remove hydrogen and add oxygen to the molecule. The polymer is further purified by carbonisation, done by heating it to a temperature of 2500°C in a nitrogen rich environment. The result depends on the quality of the fibre and is a polymer having more than 90% carbon in it. The final step in the manufacture of carbon fibre is called sizing. Here the fibres are weaved into sheets and embedding in an epoxy resin. What you get in the end is the characteristic black carbon fibre sheet which you can use to make a variety of things.

**Types of carbon fibre compounds and their uses**

Carbon fibre compounds are very expensive compounds. Different types of carbon fibre compounds can be used for a variety of purposes.

For high temperature applications, carbon fibre reinforced graphite is ideal.

Carbon fibre can be used to filter high temperature gases as a corrosion resisting electrode with an anti-static component.
Carbon fibre compounds with metals are avoided as the combination forms metal carbides. The metals in these compounds eventually corrode. Today carbon fibre is even having applications in the field of medicine. Carbon fibres are used to complement regular skin for skin grafts.
Periodic classification of elements

At present 114 elements are known to us all these have seemingly different properties. To make the study of elements easy and systematic, they have been classified based on their properties.

Modern periodic table
In 1913 Henry mosley stated
“The chemical and physical properties of elements are a periodic function of their atomic numbers”

When the elements are arranged in order of increasing atomic numbers, they show periodicity in properties.

Characteristics of long form periodic table.
1. There are 18 vertical columns called groups.
2. 7 horizontal rows called periods.
   1st period – shortest period
   2nd and 3rd short
   4th and 5th long
   6th longest period
   7th – incomplete

1) In a group all elements contain the same number of valence electrons.
2) The number of shells increases as we go down the group.
3) In a period, the elements do not have the same number of valence electrons, but they contain the same number of shells.
4) The number of valence electrons increases by one unit as the atomic number increases on moving from left to right in a period.
5) The valence electrons determine the kind of bonds formed by an element.
Achievements.
1. Could explain the position of isotopes
2. Could explain wrong order of atomic masses of certain elements.

Trends in the modern periodic table

1) Valency - It is determined by the number of valence electrons present in an atom.
   In case of metals
   Valency = no. of valence electrons
   Mg (12) 2,8,2  valency is 2
   In case of non metals
   Valency = 8- no. of valence electrons
   S = 16 2,8,6,  valency is 8- 6 = 2

   In a period valency increases from 1 to 4 and then decreases to 0.
   In a group valency remains the same.

2) Atomic size - It refers to the radius of an atom, which is the distance between
   the centre of the nucleus and the outermost shell.
   In a period on moving from left to right atomic size decreases.
   In a group on going down the size increases gradually.

3) Metallic and nonmetallic character –
   In a period the metallic character decreases while the nonmetallic character
   increases.
   In a group amongst the metals the metallic character increases down the group.
   In non metals the non metallic character decreases.
Chapter No- 5
Periodic classification of elements (I)
(Multiple choice questions)

Q1. Which of the following decreases across the period?
   (1) Electronegativity                                              (2) Atomic radius
   (3) Non – metallic character                                      (4) None of these

Q2. The atomic radius decreases as we move across a period because
   1) atomic mass increases
   2) atomic number increases
   3) effective nuclear charge increases
   4) additive electrons are accommodated in the new electron level

Q3. Which of the following remain unchanged on moving down the group in a periodic table
   1) Valance electrons
   2) Atomic size
   3) Density
   4) Metallic nature

Q4. Which of the following is a metalloid?
   (1) Sulphur                                                      (2) Silicon
   (3) Sodium                                                       (4) Aluminium

Q5. _______ element has electronic configuration of 2, 8, 2.
   (1) Calcium                                                      (2) Beryllium
   (3) Strontium                                                   (4) Magnesium

Q6. The noble gas having duplet electrons is
   (1) Helium                                                      (2) Neon
   (3) Argon                                                       (4) Xenon
Q7. Atomic number is a more fundamental property than atomic mass. This was emphasized by
   1) Doberenier
   2) Bohr
   3) Moseley
   4) Mendeleev

Q8. Which of the following elements belong to the same group?
   1) Cu, Ag, Au
   2) Na, Mg, Al
   3) Li, Be, Al
   4) O, S, Cl
Chapter No- 5
Periodic classification of elements (II)
(C.W. ASSIGNMENT)

Q1. The reactivity of non-metals ________________ down the period.

Q2. Non-metallic character ________________ from left to right in a period.

Q3. Size of Na⁺ is ________________ than Na atom.

Q4. Atomic size ________________ from left to right in a period.

Q5. Group 2 elements are known as __________________________.

Q6. Which one of the halogens have highest non-metallic character?

Q7. Group 17 elements are called ____________________.

Q8. Group 18 elements are ___________________ valent.

Q9. Name two elements whose valencies are equal to their group number.

Q10. An element belongs to 2nd period and group 14. Is it a metal or a non-metal? Why?
Chapter No- 5
Periodic classification of elements (III)
(C.W Assignment)

Q1. What are periods and groups?

Q2. State modern periodic law.

Q3. Name the first and last member of the third period

Q4. Name the following
   a. The sum of the number protons and neutrons in the atoms.
   b. Most electro negative element.
   c. Most electro positive element.

Q5. Given below is a list of elements that form the periodic table:
   S, Al, C, Ar, Mg, F, O and B
   Choose from the above list,
   1) the most metallic element
   2) the most electronegative element
   3) elements of period 3 of the periodic table
   4) elements of group 16 of the periodic table
Q6. An element has atomic no 17. Predict its

a) Valency
b) Group number
c) Whether it is a metal or non-metal
d) Nature of the oxide found
e) Name of the element

Q7 Two elements with symbol X (atomic no. 11) and Y (atomic no. 13) are placed in the III period of the modern periodic table -
(i) Which amongst the two has more metallic character?
(ii) Calculate the valency of each element.
(iii) Element ‘Y’ is smaller than ‘X’ in terms of atomic size. Is the statement true, justify?

Q8. In the table given below some of the elements are placed in their correct positions and others are represented by hypothetical letters.

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a) Which of these has smallest radius?
b) Which of these has electronic configuration (2,8,4)?
c) What is the electronic arrangement of J?
d) Name the family of the elements represented by E, L, M, and N.
e) Which of these is an alkaline earth metal?
Q9. Two elements ‘p’ and ‘Q’ belong to the same period of the modern periodic table and are in Group-1 and Group – 2, respectively. Compare their following characteristics in tabular form:

(a) The number of electrons in their atoms.
(b) The sizes of their atoms.
(c) Their metallic characters.
(d) Their tendencies to lose electrons.
(e) The formula of their oxides.
(f) The formula of their chlorides.

Q10.

(a) What happens to the size of the atom down the group.

(b) Classify the following elements as metal, non-metal and metalloid:

(i) Calcium
(ii) Sulphur
(iii) Selenium

c) Explain how the tendency to form electropositive ions change on moving down a group?
Chapter No- 5
Periodic classification of elements (IV)

Assignment

Q1. What do you understand by periodicity? Are the properties of elements placed in a group the same? Illustrate.

Q2. Why atomic number is more important than atomic weight in determining chemical properties?

Q3. How does electronic configuration of an atom relate to its position in the modern periodic table?

Q4. Explain the variation in atomic size in a group and a period in the periodic table, Giving examples.

Q5. What will happen to electron releasing tendency of the elements in a group?

Q6. Explain why sodium is an active metal while neon is inert?

Q7. What is meant by group in a periodic table? Within a group where would you find a element with (a) most metallic character (b) the largest atomic size?

Q8. What are isotopes? Why do isotopes of an element have similar chemical property?
Many chemical reactions produce both light and heat. A burning candle is such a reaction. When a candle is lit, its flame both glows and becomes hot. It is much less common for a chemical reaction to produce light without heat. The light from such reactions is called cool light, because it is created without heat. Reactions that produce light without heat are called chemiluminescent reactions. Perhaps the most familiar chemiluminescent reactions are those that occur in living organisms. Fireflies produce light without heat by a chemiluminescent reaction. Chemiluminescent reactions that occur in living organisms are called bioluminescent reactions.

In this activity you will examine a commercial chemiluminescent chemical reaction. The reaction occurs inside a Lightstick. Lightsticks are available at many sporting goods stores, camping supply stores, and hardware stores. (Lightsticks are available from Educational Innovations) Amusement parks and carnivals often have them in the shape of bracelets and necklaces.

Open the wrapper and remove the Lightstick.

Describe the Lightstick. What does it look like? What color is it? How big is it? Is anything inside the Lightstick?

Immediately before activating the Lightstick, record today's date and the time:

Date: ____________________  Time: ____________________

Follow the directions on the wrapper to activate the Lightstick:

1. Bend the Lightstick just enough to break the thin glass tube inside the Lightstick.
2. Shake the Lightstick to mix its contents.

Observe the Lightstick in a darkened room.

Describe the appearance of the Lightstick. What is the color of the glow? Does the glow come from the entire Lightstick or only from the liquid inside the Lightstick?

Immerse the Lightstick in a glass of ice water for five minutes.
Does chilling the Lightstick affect its glow? What happens to the glow?

Immerse the Lightstick in a glass of warm water for five minutes. DO NOT USE BOILING WATER OR PLACE THE LIGHTSTICK IN THE OVEN. THE PLASTIC SHELL OF THE LIGHTSTICK CAN MELT.

What happens to the glow when the Lightstick is warmed?

Summarize how temperature affects the glow of the Lightstick.

Put the glowing Lightstick in the freezer for at least 24 hours.

Does the Lightstick continue to glow while it is in the freezer?

Remove the Lightstick from the freezer and allow it to warm to room temperature.

Does the glow come back when the Lightstick returns to room temperature?

Observe your Lightstick periodically during the day.

How does the glow change with time? How long does it take for the glow to disappear?

Where did you keep the Lightstick? What was the approximate temperature of the Lightstick? What could be done to preserve the glow of the Lightstick?

In this activity you observed the effect of temperature on the glow of a Lightstick. This effect is a result of the effect of temperature on the rate of the chemical reaction that produces the glow. Like all chemical reactions, the reaction that produces the glow is slower at lower temperatures and faster at higher temperatures. In a Lightstick, the faster the reaction the brighter the glow. When the reaction in a Lightstick occurs at a faster rate, it will use up the reactants inside more quickly than when the reaction occurs more slowly. Can you devise an experiment that would test this statement?
Q1. An organic compound ‘X’ is an essential constituent of wine and beer. ‘X’ is responsible for intoxication caused by these drinks. Oxidation of ‘X’ yields an organic acid ‘Y’ which is present in vinegar. Name the compounds ‘X’ and ‘Y’ and write their formulae.

Q2. The molecular formula C₃H₆O can represent an aldehyde as well as ketone. Write their structures and name them.

Q3. What is an ester? Describe an activity to form an ester.

Q4. What is a functional group in a carbon compound? Write the formulation for the functional groups of alcohols and carboxylic acids.

Q5. Saturated hydrocarbons take part in substitution reactions while unsaturated hydrocarbons in addition reactions. Explain.

Q6. Give reasons for the following observations:
   a) Air holes of a gas burner have to be adjusted when the heated vessels get blackened by the flame.
   b) Use of synthetic detergents causes pollution of water.
   c) Soaps are ineffective in hard water.

Q7. An organic compound ‘A’ which is sometimes used as an antifreeze and has the molecular formula C₂H₆O. Upon reaction with alkaline KMnO₄, the compound ‘A’ is oxidized to another compound ‘B’ with formula C₂H₄O₂. Identify the compounds ‘A’ and ‘B’. Write the chemical equation for the reaction which leads to the formation of ‘B’.

Q8. Two carbon compounds A and B have the molecular formula C₃H₈ and C₃H₆ respectively. Which one of the two is more likely to show addition reaction? Justify your answer Explain.
with the help of chemical reaction. How an addition reaction is useful in vegetable ghee industry?

Q9. An organic compound ‘A’ is widely used as a preservative in pickles and has molecular formula $C_2H_4O_2$. This compound reacts with ethanol to form a sweet smelling compound ‘B’.

a) Identify the compound ‘A’.

b) Write the chemical equation for its reaction with ethanol to form compound ‘B’.

c) How can we get compound ‘A’ back from ‘B’.

d) Name the process and write the corresponding chemical equation.

e) Which gas is produced when compound ‘A’ reacts with washing soda? Write the chemical equation.

Q10) Define soap. With the help of well-labeled diagram of micelle, explain the cleansing action of soap.

Q11) State how would you distinguish between Acetic acid and Ethanol in your laboratory. Give chemical equation of the reactions shown by them. Write the chemical equations involved.

Q12) Complete the reaction(s) given below and classify them as Combustion / Oxidation / Addition / Substitution reaction.

\[
\begin{align*}
(i) & \quad \text{alk. KMnO}_4 \\
& \quad \text{CH}_3\text{CH}_2\text{CH}_2\text{OH} \xrightarrow{\text{Heat}} \\
& \quad \text{Ni catalyst} \\
(ii) & \quad \text{C}_2\text{H}_4 + \text{H}_2 \\
& \end{align*}
\]

Q13) Draw the electron dot structure of the gas molecule which is liberated when zinc metal is treated with aqueous NaOH solution.
CHAPTER NO.  5
PERIODIC CLASSIFICATION

Q1. While classifying the elements Moseley was guided by some factors. What were these factors?
____________________________________________________________________________________

Q2. Name three elements in the second group of modern periodic table.
____________________________________________________________________________________

____________________________________________________________________________________

Q4. Name an element which has 2 electrons in N shell.
____________________________________________________________________________________

Q5. Amongst elements with atomic number 11 and atomic number 14, which has a bigger size atom and why?
____________________________________________________________________________________

Q6. Element M is in the first group of the periodic table. Write the formula of its Oxide.
____________________________________________________________________________________

Q7. An element X has configuration 2,8,8,1, while element Y has electronic configuration 2,8,7. Which of these is a metal? Write the formula of the compound formed between X and Y.
____________________________________________________________________________________
Q8. What are the names of group 2 elements?

Q9. The formula of a compound is M\textsubscript{2}O\textsubscript{3}. Predict the valency of element M.

Q10. What does the word period signify in the periodic table?

Q12. An element X readily accepts an electron from another element Y. Predict the nature of the element X.

Q13. What do you understand by periodicity in properties?

Q14. What is the reason of placing Ar before K in the Mendeleev’s periodic table?

Q15. Why are metals called electropositive elements

Value – based questions:

Q1. Vegetable oils, such as soyabean oil, groundnut oil, sunflower oil, cotton seed oil etc. develop unpleasant smell and taste when kept for a long time in hot and humid
weather, therefore these oils are hydrogenated in presence of Nickel as catalyst to form vegetable ghee. However vegetable ghee contains saturated carbon chains which are not good for health as advised by the doctors.

Now answer the following questions:

i) What is hydrogenation? What changes occur during hydrogenation of vegetable oils?

ii) What type of health problem is caused by consumption of saturated fats and how can this problem be checked?

**Q2.** The inert gases or the noble gases form group 18 of the long form of periodic table, helium is the first member of this group, it has very low boiling point and is lighter than air. It is chemically inert and does not form any compounds. It has many applications in our daily life.

Now answer the following questions:

i) Give the names and symbols of the elements of group 18.

ii) Give three uses of helium in our daily life.

iii) Why are they called noble gases.

**Q3.** Shanky and Bunty were returning home after attending a wedding. They had enjoyed the dishes served in the party. Their father was driving the car, suddenly midway a police party stopped them, a breathalyser was put into the mouth of their father and he tested positive for alcohol. He was served with a fine challan. The mood was suddenly spoiled after having a great time at the party.

i) What is breathalyser and what is its function?

ii) What are the harmful effects of excessive intake of alcohol?

iii) What values were displayed by the police.

**Q4.** Public transport in Delhi runs on CNG. This is a pollution free fuel. There were lots of hurdles in bringing CNG in public transport system, but ultimately government of Delhi succeeded in achieving this goal. According to world study, Delhi’s environment now much cleaner than what it used to be with Diesel as fuel.

i) What is the full form of CNG? What is the main constituent of this fuel?

ii) How is the fuel energy efficient?

iii) Give the formula and names of the next two higher homologues of the main constituent of CNG.

iv) What values were shown by the government of Delhi in introducing CNG in public transport system?
Elements of the Periodic Table

Across
1 The lightest inert gas. (6)
4 The element we need to breathe. (6)
5 Alkaline metal in table salt. (6)
7 Inert gas used to make bright city lights. (4)
8 2nd place in the Olympics. (6)
10 An important element in bones. (7)
13 A radioactive element often used in nuclear power stations. (7)
14 Poison gas in WWI. (8)
15 A famous poison that turns your tongue black. (7)
17 A metal sought after during the Klondike. (4)
18 The element diamonds are made from. (6)
19 This metal is used along with carbon to make steel. (4)

Down
2 Heavy metal used in paints, batteries, and radiation shields. (4)
3 The most common element in the universe. (8)
6 A liquid metal that was used in thermometers. (7)
7 Most common element in the earth's atmosphere. (8)
9 A component of gunpowder that smells like rotten eggs. (7)
11 A metal used in foil. (World Spelling) (9)
12 A metal used in wires. (6)
15 The most common inert gas in the atmosphere. (5)
16 Element used to make semi-conductors (computer chips). (7)
With just a few household chemicals you can turn a glass of colored liquid into a froth that overflows its container.

For this experiment you will need:

- 15 cm³ (1 tablespoon) of baking soda (sodium bicarbonate)
- 15 cm³ (1 tablespoon) of laundry detergent
- about 180 milliliters (3/4 cup) of water
- about 60 milliliters (1/4 cup) of vinegar
- several drops of food coloring (optional)
- a 400-milliliter (12-ounce) drinking glass
- a waterproof (plastic or metal) tray
- a teaspoon

Place the drinking glass on the tray. Put 15 cm³ baking soda and 15 cm³ laundry detergent to the glass. Add 180 mL of water and a few drops of optional food coloring. Gently stir the mixture to mix the contents of the glass. To display and observe the fizzing and foaming, quickly pour the vinegar into the glass. The mixture will foam up and over the top of the glass, covering the tray with a froth of tiny bubbles.

To produce a color change when the vinegar is added to the mixture in the glass, you can substitute some red cabbage juice for the optional food coloring. The experiment titled "Exploring Acids and Bases with Red Cabbage" gives instructions on how to prepare some red cabbage juice. With red cabbage juice, the mixture will change color from blue-green before adding vinegar to red-orange after the vinegar is added. For a different color change, try grape juice.

In this experiment, the fizz is produced by a chemical reaction between baking soda and vinegar. Baking soda and vinegar react, and one of the products of the reaction is
carbon dioxide gas. This gas forms bubbles that are surrounded by the liquid. The laundry detergent makes the bubbles last longer, and a foam is produced. The volume of the gas produced and trapped in the foam is much greater than the glass can hold, so some of it spills over the top of the glass.

Baking soda is sodium bicarbonate. Vinegar contains acetic acid dissolved in water. Sodium barcarbonate reacts with most acids. The products of the reaction with vinegar are carbon dioxide gas, sodium acetate, and water.

The reaction of sodium bicarbonate to form carbon dioxide gas is the basis of its use as a leavening agent in baking. Cakes are solid foams. The foam is produced when bubbles of carbon dioxide from the reaction of sodium bicarbonate are trapped in the batter. As the cake bakes, the batter dries, and the trapped bubbles of carbon dioxide form the holes in the cake.
MULTIPLE CHOICE QUESTIONS BASED ON EXPERIMENTAL SKILLS

Q1) The product formed when quick lime is treated with water.
   a) calcium hydride
   b) calcium bicarbonate
   c) calcium carbonate
   d) calcium hydroxide

Q2) When ferrous sulphate crystals are heated it gives off gases, these gases
   a) have a suffocating smell like burning sulphur
   b) fume strongly in the moist air
   c) do not fume strongly in the moist air
   d) both a) and b)

Q3) When iron nails are placed in copper sulphate solution the colour of copper sulphate changes from
   a) Green to blue
   b) Blue to green
   c) Red to blue
   d) Blue to red

Q4) Barium chloride solution is mixed with sodium sulphate solution, a white insoluble ppt. which is formed is
   a) barium sulphide
   b) barium sulphite
   c) barium sulphate
   d) barium carbonate

Q5) Which is the incorrect statement, A student drops some quick lime in water he observes
   a) the lump disintegrates with hissing sound
   b) the mixture becomes hot
Q6) Zinc metal displaces hydrogen from hydrochloric acid because zinc metal is
   a) less electropositive than hydrogen
   b) more electropositive than hydrogen
   c) as much electropositive as hydrogen
   d) none of these

Q7) Which chemical on treating with HCl gives CO₂ gas
   a) Sodium chloride
   b) Sodium nitrate
   c) Sodium carbonate
   d) Sodium hydroxide

Q8) The ions which are responsible for change of colour of red litmus to blue are
   a) hydroxyl ions
   b) sodium ions
   c) potassium ions
   d) zinc ions

Q9) The zinc metal used in the lab for doing experiments are available in the form of
   a) pellets
   b) granules
   c) filings
   d) strips

Q10) The formula of sodium zincate is
    a) Na₂ZnO₂
    b) NaZnO
    c) Na₂ZnO
    d) NaZn₂O
11) To test the presence of an acid with a strip of red litmus paper you would
   a) dip the strip as it is in the sample and see the colour change
   b) moisten the paper and dip in the sample
   c) first dip it in common salt solution and then use it to test the sample
   d) first dip it in alkaline solution and then use it to test the sample

Q12) A liquid sample turned red litmus paper blue. This indicates that the sample is
   a) An alcohol
   b) Distilled water
   c) Sodium hydroxide solution
   d) Hydrochloric acid

Q13) The substance used to determine the pH of a solution is
   a) litmus solution
   b) methyl orange solution
   c) universal indicator
   d) turmeric solution

Q14) The two colors seen at the extreme ends of the pH chart are
   a) red and green
   b) green and blue
   c) red and orange
   d) red and blue

Q15) A student tested the pH of distilled water and found that the color of paper changed to green and he checked the pH again after dissolving a pinch of common salt in it, the color of the pH paper this time was
   a) yellow
   b) red
   c) green
   d) blue
Q16) A few drops are added to the sample of water. The pH of the solution
   a) increases
   b) decreases
   c) remains same
   d) none of these

Q17) Which one of the following is not required to find the pH of the solution?
   a) pH paper
   b) Litmus paper
   c) Universal indicator
   d) Standard pH value chart

Q18) The chemical reaction between ferrous sulphate solution and zinc can be represented by the balanced equation
   a) FeSO₄ (aq) + Zn (s) → ZnSO₄(aq) + Fe(s)
   b) Fe₂SO₄ (aq) + 2Zn (s) → Zn₂SO₄(aq) + 2Fe(s)
   c) FeSO₄ (aq) + Zn (s) → ZnSO₄(aq) + Fe(s)
   d) Fe(SO₄)₂ (aq) + 2Zn (s) → 2 ZnSO₄(aq) + Fe(s)

Q19) Zinc granules were added to Solutions of ferrous sulphate, zinc sulphate, copper sulphate and aluminium sulphate as shown below. You would observe the deposition of metal on zinc in beakers

```
zinc sulphate      copper sulphate      aluminium sulphate      ferrous sulphate
(I)                (II)                 (III)                     (IV)
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Class X / Chemistry/69
a) I and III  
b) II and IV  
c) I and II  
d) III and IV  

Q20) 10 ml of freshly prepared iron sulphate was taken in each of the four test tubes. Strips of copper, iron, zinc and aluminium were introduced in different test tube. A black residue was obtained in two of them. The right pair of forming the precipitate is  
   a) copper and zinc  
   b) aluminium and copper  
   c) iron and aluminium  
   d) zinc and aluminium  

Q21) A piece of aluminium was dropped in copper sulphate solution. After some time the color of the solution changed from  
   a) light green to blue  
   b) blue to milky  
   c) blue to colorless  
   d) blue to yellow  

Q22) On adding sodium bicarbonate to acetic acid you immediately  
   a) observe strong effervescence  
   b) hear hissing sound  
   c) get pungent smell  
   d) notice formation of bubbles  

Q23) On adding sodium bicarbonate to acetic acid a gas evolves. Which of the following statements is not true for this gas?  
   a) it turns lime water milky  
   b) extinguishes a burning splinter  
   c) dissolves in a solution of sodium hydroxide  
   d) turns acidified $K_2Cr_2O_7$ solution green
**Smart Skills**

Q24) A small piece of zinc is added to acetic acid in a test tube
   a) no reaction takes place
   b) colorless and odorless gas is evolved which turns lime water milky
   c) pungent smelling gas is produced
   d) none of these

Q25) On adding sodium carbonate to acetic acid, a gas evolves. The gas evolved was tested with a burning splinter. Which of the following observation was reported?
   a) the flame extinguishes and the gas does not burn
   b) the gas burns with a blue flame and the splinter burns brightly
   c) the gas does not burn but the splinter burns with a pop sound
   d) the gas burns with a pop sound and the flame gets extinguished

Q. 26 Acetic acid was added to four test tubes containing the following chemicals:
   a. Sodium carbonate
   b. Blue litmus solution
   c. Lime water
   d. Distilled water

Which amongst these is/ are correct option(s) for carrying out a characteristic test for identification of a carboxylic acid (acetic acid) in the laboratory?
   a. (a) only
   b. (c) only
   c. (a) and (b)
   d. (c) and (d)

Que. 27 On adding concentrated NaOH solution to a test tube containing phenolphthalein, the colour change observed by a student would be:
   a. Pink to colourless
   b. Pink to blue
   c. Colourless to pink
   d. Red to blue

Que. 28 A student while observing the properties of acetic acid would report that this acid smells like
   (a) vinegar and turns red litmus blue
   (b) rotten egg and turns red litmus blue
   (c) vinegar and turns blue litmus red
   (d) rotten egg and turns blue litmus red
Q29. When acetic acid and sodium bicarbonate are mixed, it is observed that:
   a) a colourless and odourless gas is liberated with effervescence
   b) a colourless gas liberated turns moist blue litmus paper red
   c) a colourless gas is liberated turns lime water milky
   d) Each one

Q30. The side product formed in the saponification reaction is:
   a) Glycol
   b) Glycine
   c) Glycerol
   d) None of the above

Q31. Sunil took two water samples in test tubes A and B. He added soap solution to both. He observed soap lather in A and no lather in B. He concluded that:
   a) A is hard water
   b) B is soft water
   c) A is soft water
   d) Both A and B are hard water

Q32. Sodium hydroxide solution was added to a liquid X. The mixture was stirred for sometime. A lot of heat was produced. Among the products formed were glycerol and a solid Y. The substances X and Y respectively are:
   a) Soap, oil
   b) Oil, soap
   c) Sugar, soap
   d) Vinegar, soap

Q33. What type of reaction takes place when soap reacts with hard water?
   a) Addition reaction
   b) Decomposition reaction
   c) Displacement reaction
   d) Double displacement reaction

Q34. A solution of soap or detergent in water turns:
   a) Blue litmus red
   b) Red litmus blue
   c) Blue litmus colourless
   d) Red litmus colourless

Q35. The odour of acetic acid resembles that of:
   a) Rose
   b) Burning plastic
   c) Vinegar
   d) Kerosene
Academic Session: 2015-16  
First Term Examination  
Subject: Science  
M/7/1

Time allowed: 3 hours  
Maximum Marks: 90

General Instructions:

(i) The question paper comprises of two Sections, A and B. You are to attempt all the sections.
(ii) All questions are compulsory.
(iii) There is no choice in any of the questions.
(iv) All questions of Section-A and Section-B are to be attempted separately.
(v) Question numbers 1 to 3 in Section-A are one mark questions. These are to be answered in one word or in one sentence.
(vi) Question numbers 4 to 6 in Section-A are two marks questions. These are to be answered in about 30 words each.
(vii) Question numbers 7 to 18 in Section-A are three marks questions. These are to be answered in about 50 words each.
(viii) Question numbers 19 to 24 in Section-A are five marks questions. These are to be answered in about 70 words each.
(ix) Question numbers 25 to 33 in Section-B are multiple choice questions based on practical skills. Each question is a one mark question. You are to select one most appropriate response out of the four provided to you.
(x) Question numbers 34 to 36 in section B are two marks questions based on practical skills. These are to be answered in about 30 words each.

This paper has _6_ printed sides.

Q1 How many molecules of Pyruvate will be generated from 4 molecules of Glucose?  

Q2 Name the part of brain with which it is connected to the spinal cord.

Q3 Balance the following chemical equation

\[ \text{Pb(NO}_3\text{)}_2 + \text{KI} \rightarrow \text{PbI}_2 + \text{KNO}_3 \]

Q4 A student dropped a few pieces of marble in dilute hydrochloride solution in a test tube. The evolved gas was passed through lime water. What change would be observed in lime water? Write balanced equations for the reaction when

a) Gas was evolved

b) Gas was passed through lime water.
Q5  Show **diagrammatically**, how would you connect three resistors, each of resistance 6 Ω so that the combination has a resistance of 9 Ω. Show the calculations.

Q6  
   a) Give two advantages of geothermal energy. 
   b) Out of two solar cookers one was covered by glass plate and the other was left open. Which of the two will be more efficient and why?

Q7  Two identical resistors are first connected in series and then in parallel. Find the ratio of equivalent resistances when connected in series to that in parallel.

Q8  
   a) What is the role of fuse, used in series with any electrical appliance? 
   b) Why should a fuse with higher rating not replace a fuse with defined rating? 
   c) What precaution should be taken to avoid overloading of domestic circuit?

Q9  Briefly explain an activity to plot the magnetic field around a circular loop of coil. (Draw the relevant diagram also)

Q10  
   a) Name any two alloys of iron and give two uses of each. 
   b) The reaction between metal X and Fe₂O₃ is highly exothermic and is used to join railway tracks. Identify metal X and give a chemical equation of its reaction with Fe₂O₃

Q11  Write an activity to show that metals are good conductors of heat.

Q12  A white soft substance is used to make cast of statues. 
   
   a) Give the chemical name and formula of the substance. 
   b) Why should we store it in moisture proof container? 
   c) What precaution should be taken during the preparation of the substance

Q13  Show the formation of Na₂O by transfer of electrons. Why do ionic compounds conduct electricity in molten state and not in solid state?

Q14  What is a Gustatory receptor? Differentiate between a Synapse and Neuromuscular Junction.

Q15  What is a reflex arc? Along with a diagram explain its functioning.

Q16  Draw a neat diagram of Neuron and label Dendrites, Axon cell body and myelin sheath.

Q17  A student fixes a sheet of white paper on a drawing board. He places a bar magnet in the centre and sprinkles some iron filings uniformly around it. Then she taps the board gently and observes that the iron filings arrange themselves in a particular pattern. 
   
   a) What does the crowding of iron filings at the ends of the magnet indicate? 
   b) Write two properties of magnetic field lines.
Q18  A copper article generally turns green when kept in open for a few days. The article when rubbed with lemon again starts shining.
   a) Why do copper articles turn green?
   b) Name the green substance formed and give its chemical formula.
   c) Why curd or sour substances should not be stored in copper vessel.

Q19  Give reasons for the following with equations
   a) A pinch of baking powder is added to make breads and cakes.
   b) Zinc oxide is amphoteric.
   c) Respiration is an exothermic process.
   d) Blue colour of copper sulphate crystals disappear on heating

Q20  a) Which method will you use to reduce the following. Explain by giving suitable example.
   i) Oxides of less reactive metals
   ii) Oxides of moderately reactive metals.
   b) Explain electrolytic refining of copper.

Q21  a) What is electromagnetic induction?
   b) Explain two methods of producing induced current.
   c) State the rule, which gives the direction of induced current.
   d) List any two uses of an electromagnet.

Q22  a) Derive an expression for power P consumed by a device having resistance R and potential difference V.
   b) In a household 5 tube lights of 60 W each are used for 5 hours and an electric press of 500 W for 4 hours every day. Calculate the total electrical energy consumed in the month of April.

Q23  a) What steps would you suggest to minimise environmental pollution caused by burning of fossil fuels.
   b) Mention any three limitations of harnessing wind energy on a large scale.

Q24  a) Give one feature that is common to the following pairs
   1. Cuscuta and Tapeworm
   2. Glycogen and starch
   3. Gills and lungs.
   b) Roots are negatively phototropic. Explain. Name the hormone responsible for the plant response to light.
SECTION B

Q25 Four solutions P, Q, R and S were given to a student to test their nature by using pH paper. He observed that the color of paper turned to red, blue, green and orange respectively when dipped in four solutions.

The correct conclusion made by the student would be that

a) P, Q, R are acidic.
b) P and S are acidic
c) Q, R and S are basic.
d) Q and S are basic

Q26 A student added dilute HCl to a test tube containing Zinc granules and made the following observations.

i) The Zinc surface becomes dull and black.
ii) A gas evolved.
iii) The solution remained colorless.

The correct observations are.

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

Q27 What is the correct method to show that iron is more reactive than copper?

a) Dip iron metal in a solution of copper sulphate and wait for some time.
b) Heat iron and copper metals at high temperature.
c) Dip copper metal in a solution of iron sulphate and wait for some time.
d) Study the reactions of both the metals with sulphuric acid.

Q28 Rohan is asked to make a peel mount from the leaf of Maize plant. He should take

the epidermal peel from

a) Mid rib region
b) Lower epidermis
c) Upper epidermis
d) Petiole

Q29 Apart from its shape guard cells differ from the surrounding cells of epidermis in having

a) Cell wall
b) Cell membrane
c) Chloroplasts
d) Mitochondria

Q30 During Destarching, one of the following events occurs in the plant

a) New starch is synthesized from glucose
b) Glucose is broken down to starch
c) Starch is broken down to glucose.
d) Both (a) and (c)
Q31 A cell, resistor, an ammeter and a key are arranged in the circuit diagram as shown below. The current recorded will be maximum in which circuit?

- (A)
- (B)
- (C)

a) A
b) B
c) C
d) Same in all

Q32 The equivalent resistance of a series combination of two resistors is 2 ohm. If one of them is 1 ohm the other will be

a) 2 ohm
b) 1 ohm
c) 5 ohm
d) 3 ohm

Q33 The ammeter has 10 divisions between 20mA and 30mA. The least count of the ammeter is

a) 0.5 mA
b) 1.0 mA
c) 0.25mA
d) 0.05mA

Q34 In an experiment to find relationship between potential difference and current a student noted four different sets of reading using same resistor.

<table>
<thead>
<tr>
<th>Set of readings</th>
<th>Voltmeter reading (V)</th>
<th>Ammeter reading (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.2</td>
<td>0.64</td>
</tr>
<tr>
<td>B</td>
<td>4.5</td>
<td>0.90</td>
</tr>
<tr>
<td>C</td>
<td>5.1</td>
<td>1.00</td>
</tr>
<tr>
<td>D</td>
<td>5.5</td>
<td>1.40</td>
</tr>
</tbody>
</table>

Which of these sets is most probably incorrect? Give reason.

a) A
b) B
c) C
d) D
Q35  When zinc is treated with sodium hydroxide solution.
   a) A colorless and odourless gas H₂ is evolved.
   b) A colorless and odourless gas CO₂ is evolved.
   c) A colorless and odourless gas O₂ is evolved.
   d) None is correct.
Give a chemical reaction for the above.

Q36  In the experimental set up to demonstrate respiration, lime water was taken
instead of KOH, in the test tube kept inside the flask containing the germinating
seeds and the set up was made air tight. One of the following sets of observation is
   correct
   a) The water level will rise and lime water will turn milky
   b) Water level will fall and lime water will turn milky
   c) Water level will not change and lime water will turn milky
   d) Water level will rise and lime water will not change colour
बिज्ञान

संकल्पित परीक्षा-II
SUMMATIVE ASSESSMENT-II

निर्धारित समय : 3 घंटे
Time allowed : 3 hours

सामान्य निर्देशः
(i) इस प्रश्न-पत्र को दो भागों, भाग अ और भाग ब, में बाँटा गया है। आपको दोनों भागों के प्रश्नों के उत्तर लिखने है।

P.T.O.
(ii) सभी प्रश्न अनिवार्य हैं।

(iii) आपको भाग अ और भाग ब के सभी प्रश्नों के उत्तर पूर्वक-पूर्वक भाग आधार पर लिखने होगे।

(iv) भाग अ के प्रश्न संख्या 1 से 3 के प्रश्न एक-एक अंक के हैं। इसके उत्तर एक सब्ज के अन्वय एक वाक्य में हैं।

(v) भाग अ के प्रश्न संख्या 4 से 7 के प्रश्न दो-दो अंकों के हैं। इसके उत्तर लगभग 30–30 सब्जों में देने हैं।

(vi) भाग अ के प्रश्न संख्या 8 से 19 के प्रश्न तीन-तीन अंकों के हैं। इसके उत्तर लगभग 50–50 सब्जों में देने हैं।

(vii) भाग अ के प्रश्न संख्या 20 से 24 के प्रश्न पाँच-पाँच अंकों के हैं। इसके उत्तर लगभग 70 सब्जों में देने हैं।

(viii) भाग ब के प्रश्न संख्या 25 से 42 के प्रश्न प्रयोगात्मक कौशल पर आधारित बहुविकल्पी प्रश्न हैं। इसके उत्तर एक अंक का है। जिसे आप चार विकल्पों में से अपने पसंद एक सब्ज से उपयुक्त विकल्प चुनना है।

General Instructions:

(i) The question paper comprises of two sections, A and B. You are to attempt both the sections.

(ii) All questions are compulsory.

(iii) All questions of Section A and all questions of Section B are to be attempted separately.

(iv) Question numbers 1 to 3 in Section A are one-mark questions. These are to be answered in one word or one sentence.

(v) Question numbers 4 to 7 in Section A are two-mark questions. These are to be answered in about 30 words each.
(vi) **Question numbers 8 to 19 in Section A are three-mark questions. These are to be answered in about 50 words each.**

(vii) **Question numbers 20 to 24 in Section A are five-mark questions. These are to be answered in about 70 words each.**

(viii) **Question numbers 25 to 42 in Section B are multiple choice questions based on practical skills. Each question is a one-mark question. You are to select one most appropriate response out of the four provided to you.**

**भाग अ**

**SECTION A**

1. समूह-1 और समूह-2 के सत्रों के इलेक्ट्रॉनिक विन्यासों में कोई एक अन्तर लिखिए।

Write any one difference in the electronic configurations of group-1 and group-2 elements?

2. ‘जैव-विकास’ के क्षेत्र में चार्ल्स डार्विन का योगदान लिखिए।

Write the contribution of Charles Darwin in the field of ‘evolution.’

3. “हमें अपने संसाधनों का प्रबन्धन करने की आवश्यकता है!” इस कथन की पुष्टि के लिए दो कारणों की सूची बनाइए।

“We need to manage our resources.” List two reasons to justify this statement.

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3

[P.T.O.]
4. सजीव जीवधारियों में विभाजन के अतिरिक्त अलेग्निक-जनन की चार विधियों की सूची बनाइए।

List four modes of asexual reproduction other than fission in the living organisms.

5. अवतंत दर्पण के सुख्य अंश के समान, जिसे आपतत्रित किरण के संगत दर्पण से प्राप्त होने वाली किरण का पथ दर्शाने के लिए किरण आरेख बनाइए। इस आरेख पर आपतत्रित कोण और परम्परण कोण अंकित कीजिए।

Draw a ray diagram to show the path of the reflected ray corresponding to an incident ray of light parallel to the principal axis of a concave mirror. Mark the angle of incidence and angle of reflection on it.

6. उन दो पर्यावरण हितेष्वी आदेशों / प्रदायों की सूची बनाएं जिनें किसी परीक्षा / समान के सबी सदस्यों को अपनाने की आवश्यकता है। स्पष्ट कीजिए कि इन आदेशों का पालन करने से “पर्यावरण बचाई” लाभ में फिस प्रकार सहायता मिलेगी।

List two environment friendly practices or habits which need to be followed by every member of a family / community. Explain how these practices will support the “Save the Environment” mission.

7. “समृद्ध जीवन रीति का पर्यावरण पर उपभोक्ता होता है!” किसी एक उदाहरण की सहायता से इस कथन की पुष्टि कीजिए।

“Affluent life style has a negative effect on the environment.” Justify this statement with the help of an example.
8. “हमारे खाद्यत्र सूक्ष्म तथा चावल, सब्जियाँ तथा फलों, और मांस तक में भी पीढ़क सस्यनों के अवशिष्ट विभिन्न मामलों में पाए जाते हैं। कारण देखकर व्यक्ति की स्थिति के अनुसार ऐसा किस प्रकार और कौन होता है?

“Our food grains such as wheat and rice, the vegetables and fruits and even meat are found to contain varying amounts of pesticide residues.” State the reason to explain how and why it happens?

9. प्रकाश के अवरूप के नियम लिखिए। यदि निराकार में प्रकाश की धारा 3×10^8 ms⁻¹ है, तो उस माध्यम का निरन्तर अवरूपांक 1.5 है, में प्रकाश की धारा ढाल कीजिए।

State the laws of refraction of light. If the speed of light in vacuum is 3×10^8 ms⁻¹, find the speed of light in a medium of absolute refractive index 1.5.

10. कोई गोलीय दर्पण उस बिंदु का, जो दर्पण के छायांक से 30 cm दूरी पर स्थित है, –1 आवर्तन का प्रतिबिम्ब पद्धतिक बनता है।

(i) इस प्रकरण में दर्पण का प्रकाश लिखिए।
(ii) इस दर्पण की फोक्सल दूरी कितनी है?
(iii) प्रतिबिम्ब की प्रकृति क्या है?
(iv) इस प्रकरण में प्रतिबिम्ब बनना दशन के लिए किसर आरेख खिंचिए।

A spherical mirror produces an image of magnification –1.0 on a screen placed at a distance of 30 cm from the pole of the mirror.

(i) Write the type of mirror in this case.
(ii) What is the focal length of the mirror?
(iii) What is the nature of the image formed?
(iv) Draw the ray diagram to show the image formation in this case.
11. एस्टर क्या होते हैं ? इन्हें कैसे बनाया जाता है ? इनके दो उपयोगों की सूची बनाइए।

What are esters? How are they prepared? List two uses of esters.

12. हाइड्रोकार्बनों की किसी ऐसी श्रृंखला का नाम और सामान्य सूत्र लिखिए जिसके साथ हाइड्रोजन की संक्लान अभिक्रिया हो सके। किसी संक्लान अभिक्रिया के लिए आवश्यक राशियों का उल्लेख करते हुए, उसका रासायनिक समीकरण लिखिए उसके अभिक्रान्तों एवं उत्पादों के नामों का उल्लेख कीजिए।

Write the name and general formula of a chain of hydrocarbons in which an addition reaction with hydrogen can take place. Stating the essential conditions required for an addition reaction to occur write the chemical equation giving the name of the reactant and the product of such a reaction.

13. (a) नीचे दिए गए पदों की परिभाषा लिखिए:

(i) संयोजकता, (ii) परमाणु रासायन

(b) आधुनिक आवर्त सारणी के किसी आवर्त में कक्ष से कक्ष तक की संयोजकता एवं परमाणु रासायन में किस प्रकार परिवर्तन होते हैं?

(a) Define the following terms:

(i) Valency; (ii) Atomic size

(b) How do the valency and the atomic size of the elements vary while going from left to right along a period in the modern periodic table?
14. दो तत्वों 'X' (प्रमाण संख्या 17) और 'Y' (प्रमाण संख्या 20) पर विचार कीजिए।
   (i) पुढ़ी करते हुए इन तत्वों की आधुनिक आवश्यक सारणी में स्थितियाँ का उल्लेख कीजिए।
   (ii) ‘X’ तथा ‘Y’ के संयोग से बनने वाले यौगिक का सूचित लिखिए।
   (iii) बनने वाले यौगिक की हल्काहल किन्तु संरचना लिखिए तथा इन दोनों तत्वों के बीच बने आकार की प्रकृति का उल्लेख कीजिए।

Consider two elements 'X' (Atomic number 17) and 'Y' (Atomic number 20)
(i) Write the positions of these elements in the modern periodic table giving justification.
(ii) Write the formula of the compound formed by the combination of 'X' and 'Y.'
(iii) Draw the electron-dot structure of the compound formed and state the nature of the bond formed between the two elements?

15. किसी जीव के शरीर को कई भागों में काटने के पश्चात भ्रेत्य करने पर यह पाया गया कि उसके कई भाग नए जीवों की भांति नवपन्न हो गए हैं। इस प्रक्रिया का नाम लिखिए और ऐसे दो जीवों के नाम लिखिए जिनमें इस प्रक्रिया का प्रभाव किया जा सकता है। इनमें से किसी एक का उदाहरण देकर नए जीव के विकसित होने का समय एवं प्रक्रिया किया जाने वाले परिवर्तनों को दर्शाने के लिए व्यवस्था आरेख कीजिए।

On cutting the body of an organism into many pieces it was observed that many of these pieces developed as new individuals. Name the process and list two organisms in which this process may be observed. Draw a schematic diagram to illustrate the changes that are likely to be observed during the development of new individuals in any one of the organisms named.
16. मानवों द्वारा उपयोग की जाने वाली गर्भनिरोध की चार विधियों की सूची बनाए।
इन विधियों का उपयोग किसी परिस्थि के स्वास्थ्य एवं समृद्धि को प्रत्यक्ष रूप से कैसे प्रभावित करता है?

List any four methods of contraception used by humans. How does their use have a direct effect on the health and prosperity of a family?

17. (a) इसका प्रमाण दीजिए कि पक्षियों का विकास रूपरूप से हुआ है।
(b) कीटों, ऑक्टोपस, प्लैनरिया और क्रोकोडिल्स में भी आँख की संरचना होती है। क्या हम इन जीवों की इनकी आँखों के आधार पर एक साथ समृद्धिकर कर सकते हैं? अपने उत्तर की ज़रूरत सहित दुष्क दीजिए।

(a) Give the evidence that the birds have evolved from reptiles.
(b) Insects, octopus, planaria and vertebrates possess eyes. Can we group these animals together on the basis of eyes that they possess?
Justify your answer giving reason.

18. (a) मेंडल ने अपने, एक मटर के पीलों के साथ किए गए गोल बीच वाले पीलों का इतिहास बीच वाले पीलों से संबंधित कराया। कारण स्पष्ट बनते हुए उसके F₁ तथा F₂ संततियों के प्रक्षेप लिखिए।

(b) मेंडल द्वारा मटर के पीलों में अपने प्रयोग के लिए चुने गए गोलाई के अतिरिक्त अन्य किन्हीं दो विपरीत (विकल्पी) लक्षणों की सूची बनाए।

(a) Mendel in one of his experiments with pea plants crossed a variety having round seeds with one having wrinkled seeds. Write his observations, giving reasons, of F₁ and F₂ progeny.

(b) List any two contrasting characters other than roundness of pea plants that Mendel used in his experiments with pea plants.
19. नामांकित अरेख की सहायता से तारों के टिमटिमाने के कारण की व्याख्या कीजिए।

Explain with the help of a labelled diagram, the cause of twinkling of stars.

20. कोई छात्र किसी लेंस का उपयोग करके मोमबत्ती की ज्वाला के प्रतिबिंब को स्क्वूल- प्रयोगशाला की दीवार पर प्रक्षेपित करना चाहता है:

(a) उसे किस प्रकार का लेंस उपयोग करना चाहिए और क्यों?

(b) लेंस की फोकस दूरी ‘F’ के पार पर उसे ज्वाला को लेंस से कितनी दूरी पर रखना चाहिए कि दीवार पर ज्वाला का (i) विस्तृत (बड़ा), (ii) छोटा प्रतिबिंब बने?

(c) प्रत्येक प्रकार में प्रतिबिंब बनने वाली के लिए किसण अरेख खींचिए?

A student wants to project the image of a candle flame on the walls of school laboratory by using a lens:

(a) Which type of lens should he use and why?

(b) At what distance in terms of focal length ‘F’ of the lens should he place the candle flame so as to get (i) a magnified, and (ii) a diminished image respectively on the wall?

(c) Draw ray diagram to show the formation of the image in each case.
21. (a) दूरी के सामने तीन अपवर्तन दोषों की सूची बनाए। इन दोषों को संशोधित करने के उपाय लिखिए।
(b) विकासशील देशों के लगभग 45 लाख व्यक्ति आंकाे लिखिए। इसी रूप से लगभग 30 लाख बच्चों को 12 वर्ष से कम आयु के हैं, नेपाल में अग्रणी व्यक्ति के अन्य रूपों से ठीक किया जा सकता है। आपकी आयु के छात्र व्यक्ति और किस प्रकार तत्व का सम्मिलित करके इस तत्व के विषय में लोगों में जागरूकि उत्पन्न कर सकते हैं?

(a) List three common refractive defects of vision. Suggest the way of correcting these defects.

(b) About 45 lac people in the developing countries are suffering from corneal blindness. About 30 lac children below the age of 12 years suffering from this defect can be cured by replacing the defective cornea with the cornea of a donated eye. How and why can students of your age involve themselves to create awareness about this fact among people?

22. कारण सहित व्याख्या कीजिए कि ऐसा क्यों है कि कार्बन तो C⁺⁺ भनाए और न ही C⁻⁻ अणाधिक बना सकता है, परंतु सहसंयोजी गैरिक बनता है। कारण सहित यह भी उल्लेख कीजिए कि सहसंयोजी गैरिकः

(i) कितने के कुछताक क्यों होते हैं?
(ii) क्यों गैरिक और स्वच्छ बाले क्यों होते हैं?

State the reason why carbon can neither form C⁺⁺ cations nor C⁻⁻ anions, but forms covalent compounds. Also state reasons to explain why covalent compounds:

(i) are bad conductors of electricity?
(ii) have low melting and boiling points?

31/1/3
23. (a) एकलात्मक तथा उम्मीदही उपभोक्ता में प्रचेक का एक-एक उदाहरण दीजिए।
   (b) किसी पुष्प में निष्पक्ष के पेड़वाले होने वाले तत्त्वों का उल्लेख कीजिए।
   (c) यदि प्रचेक नयी पीढ़ी दो व्यक्तियों की DNA प्रतिकृतियों का संयोजन होती है, फिर भी उसमें DNA की मात्रा नियत कैसे रहती है?

24. (a) मानव नर के उस जननांग का नाम लिखिए जो शुक्राणु उत्पन्न करता है और एक हार्मोन का नाम लिखिए। सामान्य हार्मोन का नाम तथा उसका कार्य लिखिए।
   (b) मानव मादा के जनन-तंत्र में निष्क्य स्थल का नाम लिखिए तथा उस भाग का भी नाम लिखिए जहाँ प्रयुक्त अवयव का रोपण होता है।
   (c) संक्षेप में वर्णन कीजिए कि माता के शरीर के भीतर नमूना को पोषण किस प्रकार प्राप्त होता है?

(a) Give one example each of a unisexual and a bisexual flower.
(b) Mention the changes a flower undergoes after fertilization.
(c) How does the amount of DNA remain constant though each new generation is a combination of DNA copies of two individuals?

(a) Write the name of the human male reproductive organ that produces sperms and secretes a hormone. Name the hormone secreted and state its function?
(b) Write the site of fertilization and the part where the zygote gets implanted in the human female.
(c) State, in brief, how an embryo gets its nourishment inside the mother's body.
भाग ब

SECTION B

25. आपके शिक्षक ने आपसे चने के बीज के भूमि के विभिन्न भागों का अध्ययन करने के लिए कहा है। इस प्रयोग के लिए पालन किए जाने वाले चरण नीचे लिख दिए गए हैं:

I. चने के बीजों को विशेष जल में विपोटक एक रत्त तक भीगा रहने दिए।

II. भीगे बीज को काटकर उसके विभिन्न भागों का प्रकाश कीजिए।

III. पेट्री-डिस्क में कुछ चने के शुष्क बीज सीधिए।

IV. अतिरिक्त जल को निकाल दिए।

V. बीजों को किसी सुंदरी गोले करने में बूझकर एक दिन के लिए ऐसे ही छोड़ दिए।

इन चरणों का सही ब्रेम है:

(A) III, I, V, IV, II

(B) III, I, II, IV, V

(C) III, IV, V, I, II

(D) III, I, IV, V, II

1

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You are asked by your teacher to study the different parts of an embryo of a gram seed. Given below are the steps to be followed for the experiment:

I. Soak the gram seeds in plain water and keep them overnight.

II. Cut open the soaked seed and observe its different parts.

III. Take some dry gram seeds in a petri dish.

IV. Drain the excess water.

V. Cover the soaked seeds with a wet cotton cloth and leave them for a day.

The correct sequence of these steps is:

(A) III, I, V, IV, II  (B) III, I, II, IV, V  
(C) III, IV, V, I, II  (D) III, I, IV, V, II

26. निम्नलिखित में सब्जियों का कौन सा एक जोड़ा समवात संपर्खाओं का उदाहरण है:

(A) आलू और शाककरान्दी  (B) गाजर और मुळी  
(C) गाजर और टमाटर  (D) टमाटर और मुळी

Which one of the following pairs of vegetables is an example of homologous structures:

(A) Potato and sweet potato  (B) Carrot and radish  
(C) Carrot and tomato  (D) Tomato and radish

31/1/3  13  [P.T.O.]
27. Four students P, Q, R and S differently reported the following set of organs to be analogous:

P. Forelimb of a frog and forelimb of a lizard
Q. Forelimb of a bird and forelimb of a human
R. Wings of a parrot and wings of a butterfly
S. Wings of a bird and wings of a bat

The two students who have reported correctly are:

(A) P and Q
(B) Q and R
(C) R and S
(D) P and S

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28. Identify the figures showing the process of budding in yeast.

(A) I, II and III
(B) II, III and IV
(C) I, II and IV
(D) III, IV and I
29. Study the following diagrams showing various stages of binary fission in Amoeba:

The correct sequence of these diagrams should be:

(A) I, IV, III, II, V
(B) I, III, IV, II, V
(C) I, II, IV, III, V
(D) I, II, III, IV, V
30. A student adds a few drops of ethanoic acid to test tubes X, Y and Z containing aqueous solutions of sodium chloride, sodium hydroxide and sodium carbonate respectively. If he now brings a burning splinter near the mouth of the test tubes immediately after adding the ethanoic acid in each one of them, in which of the test tube or test tubes the flame gets extinguished?

(A) X and Y

(B) Y and Z

(C) X and Z

(D) only Z
31. When you add about 2 mL of acetic acid to a test tube containing an equal amount of distilled water and leave the test tube to settle after shaking its contents, then after about 5 minutes what will you observe in the test tube:

(A) A white precipitate settling at its bottom,

(B) A clear colourless solution,

(C) A layer of water over the layer of acetic acid, or

(D) A layer of acetic acid over the layer of water.
32. In order to study saponification reaction we first prepare 20% solution of sodium hydroxide. If we record the temperature of this solution just after adding sodium hydroxide flakes to water and also test its nature using litmus, it may be concluded that the process of making this solution is:

(A) exothermic and the solution is alkaline.

(B) endothermic and the solution is alkaline.

(C) endothermic and the solution is acidic.

(D) exothermic and the solution is acidic.

In order to study saponification reaction we first prepare 20% solution of sodium hydroxide. If we record the temperature of this solution just after adding sodium hydroxide flakes to water and also test its nature using litmus, it may be concluded that the process of making this solution is:

(A) exothermic and the solution is alkaline.

(B) endothermic and the solution is alkaline.

(C) endothermic and the solution is acidic.

(D) exothermic and the solution is acidic.
33. While studying saponification reaction for the preparation of soap, the teacher suggested to a student to add a small quantity of common salt to the reaction mixture. The function of common salt in this reaction is to:

(A) reduce the alkalinity of the soap,
(B) reduce the acidity of the soap,
(C) enhance the cleansing capacity of soap, or
(D) favour precipitation of soap.

34. कोई विद्यार्थी चार पर्सनलियों P, Q, R तथा S में, प्रत्येक में लगभग 6mL आसुत जल लेकर, प्रत्येक पर्सनली में चार विभिन्न लवणों को समान मात्रा में योगों है। वह पर्सनली 'P' में सोडियम क्लोराइड, 'Q' में पॉटशिमयम क्लोराइड, 'R' में कैल्सियम क्लोराइड तथा 'S' में मैनीशिमय क्लोराइड योगों है। इसी प्रमाण वह प्रत्येक पर्सनली में सांदुन के विकल्प की 10 बूझी इलाका पर्सनली को भलीभांति हिलाता है। वह पर्सनलियाँ जिनमें सांदुन के साथ स्क्व (अनुसूचित पदार्थ) बन जाता है, कौन सी हैं?

(A) P तथा Q
(B) Q तथा R
(C) R तथा S
(D) Q तथा S
A student takes about 6 mL of distilled water in each of the four test tubes P, Q, R and S, then dissolves an equal amount of four different salts namely sodium chloride in ‘P’, potassium chloride in ‘Q’, calcium chloride in ‘R’ and magnesium chloride in ‘S’. He then adds 10 drops of soap solution to each test tube and shakes its contents. The test tubes in which scum (insoluble substance) is formed with soap are:

(A) P and Q
(B) Q and R
(C) R and S
(D) Q and S

35. किसी छात्र ने अवतल वर्ण की प्रोफेस का दूसरी श्रेणी करने के लिए किसी दूसरे विषय का प्रश्न कर लिया है। बिला उसने विषय के रूप में भलीभालि प्रश्नक किसी लाल भवन को चुना है तो निम्नलिखित में से कौन सा एक विकल्प बनने वाला प्रश्न का सही वर्णन करता है:

(A) आधारी, उल्टा और लाल रंग का छोटा प्रतिक्रिया
(B) वास्तविक, सीधा और गुलाबी रंग का छोटा प्रतिक्रिया
(C) वास्तविक, उल्टा और लाल रंग का छोटा प्रतिक्रिया
(D) आधारी, सीधा और लाल रंग का विपरित प्रतिक्रिया

31/1/3  21  [P.T.O.]
A student has obtained the image of a distant object with a concave mirror to determine its focal length. If he has selected a well illuminated red building as object, which of the following correctly describes the features of the image formed?

(A) Virtual, inverted, diminished image in red shade

(B) Real, erect, diminished image in pink shade

(C) Real, inverted, diminished image in red shade

(D) Virtual, erect, enlarged image in red shade

36. एक छात्र ने दिए गए लेंस की फोकस दूरी $F_1$ प्राप्त करने के लिए किसी दूरी में एक तार का निर्देशन दिया। उसके विश्लेषण के प्रारंभ के परिपेक्ष उसे एक अन्य लेंस, जिसकी फोकस दूरी $F_2$ थी, देखकर उसने उस हिस्से की तार को उसी दूरी पर फोकसित करने के लिए कहा। उस छात्र ने यह पाया कि दूरी के परिपेक्ष उसके परिपेक्ष प्राप्त करने के लिए, उसे लेंस को परिपेक्ष दूरी लेनी होगी। उस छात्र के इस प्रश्न के बारे में यह निश्चय निकाला जा सकता है कि उसकी दिए गए लेंस के लिए:

(A) अबतले तथा $F_1 < F_2$

(B) उत्तरे तथा $F_1 < F_2$

(C) उत्तरे तथा $F_1 > F_2$ या

(D) अबतले तथा $F_1 > F_2$ 1
A student has obtained an image of a distant object on a screen to determine the focal length $F_1$ of the given lens. His teacher after checking the image, gave him another lens of focal length $F_2$ and asked to focus the same object on the same screen. The student found that to obtain a sharp image he has to move the lens away from the screen. From this finding we may conclude that both the lenses given to the student were:

(A) Concave and $F_1 < F_2$
(B) Convex and $F_1 < F_2$
(C) Convex and $F_1 > F_2$
(D) Concave and $F_1 > F_2$

37. कोई छात्र कांच के प्रिज्म से गुजरने वाली किसी प्रकाश किरण के पथ को दर्शाने वाले चित्र का प्रेक्षण कर रहा है। वह छात्र यह विनिमय निकलाएगा कि प्रत्येक आपत्ति कोण के लिए प्रकाश किरण बुकती है:

(A) प्रिज्म में प्रवेश करते समय अभिलाभ की ओर तथा प्रिज्म से निर्गत होते समय अभिलाभ से दूर,
(B) प्रिज्म में प्रवेश करते समय अभिलाभ से दूर तथा प्रिज्म से निर्गत होते समय अभिलाभ की ओर,
(C) प्रिज्म में प्रवेश करते और प्रिज्म से निर्गत होते समय दोनों ही स्थितियों में अभिलाभ से दूर,
(D) प्रिज्म में प्रवेश करते और प्रिज्म से निर्गत होते समय दोनों ही स्थितियों में अभिलाभ की ओर
A student is observing the diagram showing the path of a ray of light passing through a glass prism. He would find that for all angles of incidence the ray of light bends:

(A) towards the normal while entering into the prism and away from the normal while emerging out of the prism,

(B) away from the normal while entering into the prism and towards the normal while emerging out of the prism,

(C) away from the normal while entering as well as while emerging out of the prism,

(D) towards the normal while entering as well as while emerging out of the prism.

38. नीचे दिखाई गईं एक कांच के प्रिज्म से गुजरने वाली तिम्ब्री प्रकाश विकल्प का पथ दर्शाया गया है:
This question is about the angles of a prism, namely angle of incidence, angle of emergence, and angle of deviation. The options are:

(A) O, Y, Z and N,
(B) P, Y, M and Z,
(C) O, X, M and Z,
(D) P, X, Z and N

The path of a ray of light passing through a glass prism is shown below:

In this diagram, the angle of prism, angle of incidence, angle of emergence, and angle of deviation have been represented by:

(A) O, Y, Z and N,
(B) P, Y, M and Z,
(C) O, X, M and Z,
(D) P, X, Z and N
39. किसी छात्र ने उतार लॉस द्वारा किसी क्षेत्र का विविधता प्रतिबिम्ब पद्धति पर दर्शाया गया है।
प्रतिबिम्ब बनने का तदनुसार कितने अरूण शैक्षणिक लिखित नीचे दो गयी कोण सी दो दिशाओं,
जिनके अस्तित्व के प्रत्येक पथ दर्शाए गए हैं, उस छात्र को कैसी चाहिए?

(A) I और II
(B) II और III
(C) III और IV
(D) I और III
A student has obtained a magnified image of a flame on a screen using a convex lens. To draw the corresponding ray diagram, to show the image formation, which of the following two rays whose paths after refraction are shown he should select?

(A) I and II
(B) II and III
(C) III and IV
(D) I and III

31/1/3  27  [P.T.O.]
40. किसी छात्र से उसके शिक्षक ने उत्तर लैंस के प्रकरण में विभिन्न विभिन्न-दूरीयों के लिए प्रतिविभिन्न-दूरीयों ज्ञात करने के लिए कहा। उसने सभी सामग्रियों बांटते हुए प्रश्न किया और अपने प्रश्न नीचे दी गयी सारणी में नोट किए:

<table>
<thead>
<tr>
<th>क्रम संख्या</th>
<th>विभिन्न की दूरी (cm)</th>
<th>प्रतिविभिन्न की दूरी (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>48</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>36</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td>36</td>
</tr>
<tr>
<td>6</td>
<td>16</td>
<td>48</td>
</tr>
</tbody>
</table>

प्रश्न-सारणी की जांच करने पर शिक्षक ने यह कहा कि एक प्रश्न में प्रतिविभिन्न-दूरी नोट करने में गलती हो गयी है। उस एक प्रश्न की क्रम संख्या कौन सी है जिसकी प्रतिविभिन्न-दूरी सही नहीं है।

(A) 2  
(B) 3  
(C) 5  
(D) 6  

31/1/3  28
A student was asked by his teacher to find the image distance for various object distances in case of a given convex lens. He performed the experiment with all precautions and noted down his observations in the following table:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Object distance (cm)</th>
<th>Image distance (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>48</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>36</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td>36</td>
</tr>
<tr>
<td>6</td>
<td>16</td>
<td>48</td>
</tr>
</tbody>
</table>

After checking the observation table the teacher pointed out that there is a mistake in recording the image distance in one of the observations. Find the serial number of the observation having faulty image distance.

(A) 2

(B) 3

(C) 5

(D) 6
41. किसी कव्वल के छात्रों ने “कांच के आयताकार स्तूप से गुजरने वाली किसी प्रकाश किरण का पथ आरंभित करता” प्रयोग के आधार पर नीचे दिए गए निष्कर्षों में से किस निष्कर्ष को सही माना?

(A) आपतन कोण निर्गुण कोण से बड़ा है,

(B) निर्गुण कोण अपशूर्ण कोण से छोटा है,

(C) निर्गुण किरण अपशूर्ण किरण के समान्तर है,

(D) अपशूर्ण किरण कोण निर्गुण किरण एक-दूसरे के समान्तर है।

On the basis of their experiment, “To trace the path of a ray of light through a rectangular glass slab,” students of a class arrived at which one of the following conclusions:

(A) Angle of incidence is greater than the angle of emergence,

(B) Angle of emergence is smaller than the angle of refraction,

(C) Emergent ray is parallel to the refracted ray,

(D) Incident ray and emergent ray are parallel to each other.
42. “कांच के आयताकार खंभे से गुजरने वाली किसी प्रकाश किरण का पथ आरेखित करना”
प्रयोग को करने के लिए नीचे दी गयी चार प्राथमिक व्यवस्थाओं I, II, III और IV का 
अध्ययन कीजिए।

![Diagram](image)

इनमें से किस व्यवस्था से स्वीकृत परीक्षण प्राप्त होने की संभावना है? (P₁ तथा P₂ आपतित 
किरण पर गाढ़ी गाढ़ी दो पिंजों की स्थितियाँ हैं) ?

(A) I
(B) II
(C) III
(D) IV

31/1/3  31

[P.T.O.]
Study the following four experimental set-ups I, II, III and IV for the experiment, “To trace the path of a ray of light through a rectangular glass slab.”

![Diagram of experimental set-ups I, II, III, IV]

Which of the marked set-ups is likely to give best results (P₁ and P₂ are the positions of pins fixed on the incident ray) ?

(A)   I  
(B)   II  
(C)   III  
(D)   IV