SCIENCE & BIOTECHNOLOGY

SYLLABUS GUIDELINES
Based on CBSE, ICSE & GCSE Syllabus & NCF guidelines devised by NCERT

CLASS I

1. **About Plants**
   What are their types, how do they grow, what they give us. How they are useful to us. What are major parts of plants, seed, flower, leaves.

2. **About Animals**
   World of animals, types of animals, what they eat, where they live, what are their groups called, what are the names of their home, how they grow.

3. **Air**
   What is Air, why it is necessary, fun with air, what can we do with air.

4. **Water**
   Why we need water. What are the work where we use water. Forms of water.

5. **Weather**
   Day and night, Sunny day, Cold day, Rainy day, Summer, Monsoon.

6. **Sky & Space**
   General idea about Sun, Moon, Stars. Indian people at moon and space.

7. **Our needs & habits**
   What we need to keep ourselves healthy : Cleanliness, good food, exercise, walk, clothing etc. What good habits we should follow.

8. **Safety First**
   Precautions to take while on Roads, while playing outdoor games, when at home.

CLASS II

Plants
About Plants, Herbs, Shrubs, Trees, Life of Plants what we get from plants.

Animal
About different types of animals, household/pet animals, wild animals, behaviour of animals, young ones of different animals.

Air Around us
Air, features of air, what moving air can do, simple experiments of air.

Water
How water is useful, how water moves in nature - water cycle, work that moving water can do.

Up is the sky
Basic knowledge about Sun, Moon and stars, Indian astronauts.

Our Body
Various parts of our body. What work they do. How to keep our body parts clean; bones and muscles.

Food and Nutrition
What we should eat. Which food is good. Good food habits.

Safety and First-Aid
Safety rules to be followed on roads, while playing. What to do when injured. Precaution while playing indoor games.

CLASS III

1. Family and Friends
1.1 RELATIONSHIPS

My family
Who all live with you at home? How are they related to each other? Do you have relatives who do not live with you? Have they always been there?How many children did your grand parents have?

Who do you think will be your new relatives in future?

My family and me
Do you look like anybody in your family? Have you learnt anything from anybody in your family? Whom do you admire most among all your relatives? Who is the most caring and patient person? When do you meet members of your family who do not live with you?

Whom do I look like?
Do some of your relatives look similar? Which features are similar – eyes, ears, the voice or height? Are there any two people in your family who look exactly alike?

Old and the physically challenged
Do you know of people who are hard of hearing? Are many of them old? Do you have any friends who cannot hear/see well? Is there any way in which you may have helped them? Are there any sounds you like but others/elders do not?

Which animals you have seen? Which have you only heard about? Which animals have tails? How many legs?

1.2 PLANTS

Plants around us
How many different kinds of plants do you see around you? What are the differences you notice? What things around you are made of plants?

Is there a plant in your area that was not there when your grandparents were young?

Do you know of some plants which do not grow around you, say things that we eat and not grown around you?

Leaves in our lives
What different kinds of leaves do you see? Do you use plant leaves to eat on? In what other ways are leaves used?

Is there some time of the year when lots of leaves fall to the ground? Are they burnt? Have you seen a compost pit?

What leaf motifs do you find on clothes, pots, walls, animals, etc.? Do you decorate your house with leaves on some occasions?

1.3 ANIMALS

Animals: small and big
Which are the smallest and the biggest animals you have seen? Which have you only heard about? Which animals have tails? How many legs?

Some creepy crawlies – and flyers too
What different kinds of small crawling animals do you know? Where and from what does each of them hide? Which insects can crawl and also fly? Which ones bite us? Can flies make us ill? Why does a spider make a web?

Birds
Which are the birds you see around your area? Do they like some trees more than others? What do they eat? Can you recognize birds by their feathers?

What are the different sounds they make?

Are they saying something to each other? Are there some birds that come from other places?

Do you feed any birds or place water for them?

1.4 WORK AND PLAY

Work around me
What are the different kinds of work done around me? What work does my mother/ father/ brother/ sister etc. do? What work do I do? What work do others do? When I am not working what do I do? When my father/ mother is not working what do they do?

Working children
What kind of work was done by children when your grandparents were young? Has that changed today? Who are the children you know who work and go to school/ who work and cannot go to school?

Games we play
What games do I play? Did my grandparents play the same games? Are these indoor/outdoor?

2. Food

Foods from plants and animals
Which of these is food – red ants, bird's nests, snakes, bananas, goat's milk, etc.? What plants do you eat - what parts of the plant? What food do we take from animals?

Cooking
What do you eat that is not cooked? What is eaten only when cooked? How do you cook food? What do you cook it on? What are the different kinds of vessels used for cooking? What are they made of? Is water used in all forms of cooking? Which food is cooked without using water? How?

Eating in the family
Do all members of the family eat the same food in your family? Who eats more? Who eats last in your family? Who buys the food and what is bought from the market? Who cooks the food in your family? What do babies have for food? When do babies start eating and what do they eat other than milk?

What animals eat
Do animals eat the same things? What do different animals eat? Do you feed the animals around you - what? What do they take from your house even when not fed?

3. Shelter

Houses and houses
Have you seen - a house on stilts, a tent, a flat on the tenth floor, a house on wheels or a house on a boat?

Do you know anyone living in such houses? Why do people use such houses?

Decorating and cleaning our shelter
How do you decorate your shelter? Do you draw designs on your walls/ floor or decorate with leaves/flowers/other objects? How do you keep your house clean? Do you also help in cleaning? Who mops and sweeps it? Where do you throw the garbage? Do you have any problems living in your house during rains, summer or winter? Have you seen houses with sloping roofs? Why are they made sloping?

My family and other animals
Who all live with you? Which animals live with you. Which are the biggest and the smallest animals living in your house? From where do they get their food? Where in your house do these animals live? Which of them are seen only at night?

Mapping my neighbourhood
How big is your school? What kind of a building is it? Can you draw a picture of your school and your classroom ? Do you know your way around your neighbour-hood? Can we explain to someone how to reach the post office or the bus stand from our house?

4. Water

Water for my family
What are the main sources of water in your locality? Who fetches the water and from how far? Do all the people in your locality use the same source of water?

Are some people not allowed to take water from where you take it? From where do you get water? Does it look clean enough for drinking?

Do animals and plants need water?
What happens if plants and animals do not get water – how do you see that a plant or animal is thirsty? Do all animals/ plants need the same amount of water? Which plants/ animals need the least?

Water shortage
When is it difficult to get water? Are there some people in your area who always face water shortage? What would happen if we had no water? Have you seen water being wasted – how? How can we avoid it? Do you reuse water?

Water in our lives
Which of your daily activities use water? Do you and others you know wash your hands and feet before you enter the house? Why do you think this is done?

Can you describe the scene of a rainy day – with details about birds, animals, plants and yourself.

Storing water
How do you store water in your home? Do you collect rainwater - how? How much water do you store every day? About how much do you use for drinking or bathing? In what kinds of containers do you store water for drinking/ washing/or for animals? What are the containers made of? If the water is at the same level in a narrow and a broad container does it mean they contain the same amount of water?

5. Travel

Going places
Has your family travelled together to another place? Where and what for? How did you go?

How long did it take? How far did your grandparents (or other elderly persons) travel when they were young? How did people travel in those times? How do people travel today in the desert, hilly areas, on sea, etc.

Ways to travel
How do we go to school? How do we travel to other places? How many different ways have we travelled? How many different ways of travel do we know of?

Have you been to a railway station? What all do you seen

there? Who are the people who work at the station and on the train? How did people travel in the past?

Talking without speaking

If I cannot speak, how do I tell people what I want to say?

Mailing a letter

What happens when I post a letter? How does it reach my friend? Who are the people who help to do this? Are there any other ways of sending a message? How was a letter sent in the past?

6. Things we Make and Do

Pottery

What kinds of pots do we see around us? What containers are used to store grain? What kinds of containers did people make long, long back with rings of clay- when they did not have a potter's wheel? Can you make such pots and dry them in the sun – how long do you think these will last? How does the potter bake them?

Textiles

In how many different ways can you wear a long cloth that is not stitched? How many kinds of *sarees* or *lungis* have you seen worn by people from different parts of the country?

How many different colours do we know of – how many new ones can we create? What are fast colours and what problems do we face when colours run? How do we make our own vegetable block prints and tie and dye?

CLASS IV

1. Family and Friends
1.1 RELATIONSHIPS

Your mother as a child

When your mother was your age who were the relatives she lived with?

Where do babies come from?

Have you seen a newborn baby - where did she come from? Where does the puppy/ kitten/ calf/ chick come from? Do you know of people who are looking after/ have adopted a child?

My extended family

Are there things you learn from your family members? What? Do you do anything different from other members of your family? Do all your family members live with you all the time? When do

you meet members of your family who do not live with you? What festivals do you celebrate

together?

Feeling around with eyes shut

With your eyes and ears closed can you identify the people/ animals living with you merely by

touching/smelling? By touching can you tell if anything is cold/hot, wet/ dry, smooth/rough, sticky/slippery, soft/ hard? Are there some things which you are not allowed to touch? Do you feel uncomfortable when some people touch you?

1. 2 Work and play

Fun and fights at play! Do you play the same games at school that you play at home? What things do you use to play with? Does the school provide these? Do you fight while you play? How do you decide the rules for the games? Does anyone stop you from playing? Who and why? Do you play with every child (boys and girls) in your neighbourhood? Are you stopped from playing with certain children?

How they learnt their skills

In your area do you know the people who do the following: make pots/stitch clothes/ make shoes/cure people/ build bridges/ embroider/fly planes/ repair cycles/ drive buses, etc? How well do you know them – their names, family etc? What tools do they use for their work?

Where did they learn how to do these things?

Fun at the fair/Circus

Have you been to a fair or a circus? Which is the item you liked best – was it a ride, a game, something you saw/ate/ bought? When do you fly kites?

How do you make them fly?

1.3 Animals

Animals and their friends

Which animals like to move around in groups? Which animals are shy and do not come near you? Have you seen animals playing with or riding on different animals?

Who is attracted to flowers?

Why do bees/butterflies come to flowers? How do people collect the honey from bee hives?

Long ears or short?

Which animals have ears? Which animals have hair on their body?

1.4 PLANTS

Roots of plants

Do all plants need water to grow? Which part of the plant absorbs water from the soil? When you tug at grass, why does it not come out easily? Why do plants/trees not get uprooted when there is a strong wind? Which roots are eaten by people during famine when nothing else grows?

Flowers

Which plants around us have flowers? Do they come only at some times of the year? How is the bud different from the flower? What are the different kinds of flowers we have seen – shapes, colours, petals, aroma, etc? What do we use flowers for? Do you eat any flower? Have you seen flowers motif painted on clothes, walls, floors, pots, animals?

Who sells flowers in our area? Where do these come from? How are flowers sold - for how much?

Whom do trees belong to?

Which plants/trees around you are looked after by people – by whom? Which are not? Whom do they belong to? Who eats the fruit of trees that grow wild?

2. FOOD

How we get our food

How does food reach us? Who grows it? How you seen vegetables and fruits growing? Have you seen plants of rice/ wheat/ dal etc? What are the spices do you know? Which spices can we recognize by smelling or tasting.

Special occasions

When do many people eat together? What food is eaten? Who cooks it? How is it served?

Does you get a mid day meal in school? - What items? Who provides the mid day

meal?

Tongue and Teeth

How do we taste different foods? How do teeth help us to eat – are all teeth similar? Which teeth have I dropped and how are the new ones different?

Teeth, beaks and claws

Are the teeth of other animals similar to ours? Can we tell what birds eat by looking at their beaks? Are the claws of birds also different? Is their shape related to the food they eat?

3. SHELTER

Houses then and now

Do you live in houses similar to ones your grandparents lived in ? Are houses now made of similar materials as was used then? What are the differences?

Garbage?

What do you do with waste in your house? Where do you throw it? Do you reuse any waste materials? Who takes away the garbage?

Where animals live

Do animals live in shelters? Which animals live in water? On land? Underground? Are there any animals that we see only at night? Where do they go during the day? Do we know of animals that make their own shelter?

When birds make nests

When and why do birds make their shelter? Do all birds make nests? Where do different birds nest - when do they fly away?

With what different materials do birds make their nests?

Mapping our neighbourhood

Who are my neighbors? Do I have any of the following near my house – a school, grocery shop, market, well, river or pond? Where are they with respect to your house?

4. WATER

Water fit for drinking

What are the major natural sources of water in your area? Is the water fit for drinking – do you clean it at home? Do you know how dirty water can make you ill? Why do we not drink sea water? How is salt separated from sea water?

Water sources

Where do you see large amounts of water in your neighbourhood? Is it a tank/pond/canal/river/ dam? What do men/ women/children/animals do with the water there? Is it used for bathing / washing? Who bathes/washes there

and who does not? How can we ensure that this water is not made dirty?

Do you find factories/ people dumping garbage or harmful materials into rivers or seas? Are some animals also facing problems due to what we do to the rivers or seas?

Our river/sea

Which is the river closest to our locality? Do we find any change in the water flow in different seasons? Which are the big rivers we know of? Have you seen the sea? Which are the animals found in the sea/river?

Water vanishes when heated?

Why do puddles dry? In which season do wet clothes dry easily? When do they dry with difficulty?

Have you seen and wondered where water droplets on the outside of a cold glass of water come from?

5. TRAVEL

Animals for transport

Have you travelled on a tonga / horse carriage? How is it different from travelling on a bus? Are the horses well looked after? Have you seen a horseshoe? Why is it used? What materials have you seen being transported using animals? Are there any special occasions when you ride on animals?

Paying for travel

How do you pay for travel by train/bus/boat etc? Who issues/checks the bus /rail ticket? Which currency notes and coins have you seen? Pictures of which animals can we see on a ten rupee note? Which symbol is found on every coin? How many scripts can you recognise on a note? Who is the person whose face is shown on every currency note?

What coins/notes did our grandparents use when they were young?

Travel to another place

Do you know anyone who has travelled very far from your village/city? Why did they go so far? What are they doing there? How do they travel when they visit your family?

6. Things We Make And Do

Building materials and tools

How are bricks made? What tools have you seen being used for making a wall or a house?

Is there a bridge to cross while coming to school? What kinds of bridges have we seen and where? How many kinds of bridges can we make?

CLASS V

1. Family and Friends
1.1 RELATIONSHIPS

Family tree

Can you make a family tree with as many of your relatives you can get information about?

Who are the relatives whom you have never seen? Where do they live?

Shifting from place to place

Have you always lived at the place that you now live in? If not, where does your family come from?

Who laughs the loudest?

Who is the tallest/shortest in the family? Who has the longest hair? How long? Who has the loudest voice/laugh in the house? From how far away can you hear it? Who speaks the softest? When does a child cry the loudest? When she is hungry-or angry? Who is the best cook in the family?

Our likes and dislikes

Which is your favourite colour? Which is your friend's favourite colour? Which is your favourite food? What about your friends favourite food? Do you know your friends' likes and dislikes? Are there any smells you don't like (fish, mustard oils, garlic, eggs etc) ? Do you eat fish?

Feeling to read

Do you know how people read with their hands? Do you know someone who finds it difficult to walk/ speak/see etc.? How do you think they learn to overcome the problem?

1.2 WORK AND PLAY

Team games – your heroes

Do you play any games in teams? Have you ever been captain of the team? Do boys and girls play together? Have you heard of any Indian team playing in another country? Which

is your favourite team sport? Do you know any National level player?

Local games/martial arts

What are the local games/ martial arts of your area? Do you know someone who is good at them? Have you seen a young

acrobat or wrestler practicing? Who taught them? For how long have they learnt the art/game? What are the new games in your area that were not played earlier?

What do you do in the evenings for leisure? What if there is no TV? Who decides what programmes to watch?

Blow hot blow cold

How many times do you breathe in a minute – on sitting still, just after a run? How much can you expand your chest by breathing

deeply? Can you make a glass cloudy by blowing on it? How do you blow to make something cold? Do you also blow to keep a fire going?

Clean work – dirty work?

Can you list ten different types of work that people do for you. In this list what work is seen as dirty and what is seen as clean?

What would happen if there were no one to - clean our streets/our

home/clear the garbage?

1.3 ANIMALS

How animals find their food?

If you leave some food outside your house do some animals take it away? How do they find it? Do these animals also hear/speak/ see/smell/ eat/ sleep?

What we take from animals?

What animal products do we use for clothing, shelter, etc.?

Why is the tiger in danger?

Why do people kill wild animals? Which are the animals that are poached?

People who depend on animals

Do you know people who catch/trap/hunt/ entertain using animals? Have you seen how snake

charmers/gujjars depend on animals?

What do you understand by cruelty to animals? Do you think a snake charmer is cruel to the snake?

Have you seen scenes of hunting in rock paintings or on ancient seals?

1.4 PLANTS

Growing plants

How does a plant grow from a seed? Can you grow a plant without seeds? How do you grow mangoes/potatoes? Where does the seed come from? Have you seen seeds that fly/ stick to your clothes/drift in the water?

Forests and forest people

Have you seen or heard about a forest? How do people live in forests? How is their life threatened by forests being cut? What kinds of foods do they collect from the plants there? What leaves are used for eating on?

Do your parents remember places with trees/forests where there are none today? Why were the trees cut and what is there today?

Protected trees

Have you heard of a park/sanctuary? Who looks after it? Does anybody own it?

Have you seen a place where trees are worshiped or protected by the villagers?

Plants that have come from far

Does tea come from a plant? Where did people first grow tea and what does the plant look like? Does it grow only in some places/climates? What did people drink when there was no tea in India?

2. Food

When food gets spoilt

How does food spoil? How do we know that food is spoilt? Which food spoil sooner than

others? What can we do to prevent food from getting spoilt? What do we do to keep it fresh during travel? Why do we need to preserve food? Do you leave food in your plate?

Who produces the food we eat?

Do you know of different kinds of farmers? Do all farmers own their land? How do farmers get the seeds they plant every year? What else besides seeds is required for a crop to grow?

What did people grow earlier?

Did your grandparents or any elderly person eat the same food you eat today? Do all of us eat the same kind of food? Why do

we eat different kinds of food?

When people do not get food

Do you know of times when many people do not get enough food to eat? Have you seen where extra grain is stored?

How do you know when you are hungry?

Do you know of people who get ill because they do not have enough to eat?

Our mouth – tastes and even digests food!

How do we taste food? What happens in the mouth to the food we eat? Why do we give glucose to patients? What is glucose?

Food for plants?

What do plants need for food? Do you know of any plants that eat insects? What do animals eat? Do all animals eat the same

food? Do animals eat other animals?

3. Shelter

Why different houses

Why do you have different kind of houses in different places? Different houses in the same place?

A shelter for everyone?

Does everyone have a shelter to live in? Why do people live together in villages, hamlets, colonies, neighbourhoods?

Ants live in colonies?

Do you know how bees/ ants live together in colonies?

Times of emergency

Have you heard of houses being damaged by floods/ earthquakes/ cyclones/fires/storms/

lightening? What would it have felt like? Who are the people who come to help? What can you do to help others before the doctor comes? Where can we look for help at such times? Who runs such institutions?

4. Water

Water from where in earlier times?

From where and how far did your grandparents get water? How far do you have to go for water? What are underground wells/'baolis'? Do you still see them being used? Have you seen a 'piaao'?

Water flow

From where do farmers get water to grow crops? Do all crops need the same amount of water? Have you seen water flowing upwards? What are the different ways in which you have seen water being lifted? How is flowing water used to grind grain?

Plants and animals in water

What kinds of animals and plants live in water? Are there weeds that are covering your pond/ lake/ river? Can you classify all the animals you see around you to show which ones live in water and which live on land?

What floats, sinks or mixes?

Have you ever seen anything floating in water? Can you classify as many things around you to see which float, which sink and which mix with water? Does oil mix with water? What are the similarities and differences in water, oil, milk, cold drink, etc.? How do we measure these?

Is there any way to reduce the mosquitoes in water? Have you heard of malaria? In what season do you find more people getting ill with malaria?

5. Travel

Petrol or diesel

Do all vehicles need petrol to run on? What other fuels do you know that are used for vehicles? What do trains run on? In the past what did they run on? What do tractors use as fuel? For what other purposes are petrol and diesel used?

Find out the cost of a litre of petrol/diesel in your area? Do all vehicles run an equal distance on a litre of fuel?

Rough and tough

Have you seen or been to a mountain? How and why do you think people make such difficult trips? How do you think they train for it?

Ride on a spacecraft

What all do you see in the sky – at day time? And at night? How many of the things you see in the sky are man-made?

Have you heard of people traveling in a spacecraft?

Oldest buildings

Is there any well-known monument/historical place in your area that people come to visit? What are the oldest buildings around your area? Have you traveled far to see any historical monuments?

Have you heard of those personalities who lived in these monuments or who built these?

6. Things we Make and Do

Growing Food

How do we grow food? What tools do we use for preparing the field? For cutting and harvesting? For cutting and cooking different vegetables/ dishes?

How do we water the crops? How do we lift water through a pump or a waterwheel? Can we make a water wheel, sprinkler, etc.?

CLASS VI

1. Food

Sources of food

What are the various sources of our food?

What do other animals eat?

Components of food

What is our food made up of? Why do we eat a variety of food?

Cleaning food

How do we separate the grains after harvesting the wheat / rice crop?

2. Materials

Materials of daily use

What are our clothes made of ? How did people manage when there were no clothes?

Are some of our clothes made of materials obtained from plants?

In what kinds of places do these plants grow?

Which parts of the plants are used for making clothes?

Different kinds of materials

What kinds of things do we see around us?

How things change/react with one another

In what ways do things change on being heated? Do they change back on being cooled? Why does a burning candle get shorter?

How much salt can be dissolved in a cup of water?

3. The World of the Living

Things around us

Are all things around us living? What is the difference between living and non-living? Are all living things similar? Do all living things move?

Where do plants and animals live? Can we grow plants in the dark?

The habitat of the living

How does habitat affect plants and animals? How do fish live in water?

Plants - form and function

What is the structure and function of various parts of the plants - stem, leaf and roots? How do different flowers differ from one another? How does one study flowers?

Animals - form and function

What is inside jour bodies? How do animals move? Do all animals have bones in their bodies? How do fishes move? And birds fly? What about snakes, snails, earthworms?

4. Moving Things, People and Ideas

Moving

How did people travel from one place to another in earlier times? How did they know how far they had travelled?

How do we know that something is moving?

How do we know how far it has moved?

5. How things work

Electric current and circuits

How does a torch work?

Do all materials allow current to flow through them?

Magnets

What is a magnet?

Where on a magnet do things stick?

How is a magnet used to find direction?

How do two magnets behave when brought close to each other?

6. Natural Phenomena

Rain, thunder and lightning

Where does rain come from? How do clouds form?

Light

Which are the things we can see through?

When are shadows formed? Do you get a shadow at night - when there is no light in the room, moonlight or other source of light? What colour is a shadow?

On what kinds of surfaces can we see images?

7. Natural Resources

Importance of water

What will happen to soil, people, domestic animals, rivers, ponds and plants and animals if it does not rain this year?

What ; will happen to soil, people, domestic animals, plants and animals living in rivers and points, if it rains heavily?

Importance of air

Why do earthworms come out of the soil when it rains?

Waste

Do you throw away fruit and vegetable peels and cuttings? Can these be reused? If we dump them anywhere, will it harm the surroundings? What if we throw them in plastic bags?

CLASS VII

Questions

1. Food

Sources of food

What are the various sources of our food?

Utilisation of food

How do plants and animals utilise their food?

2. Materials

Materials of daily use

Do some of our clothes come from animal sources?

Which are these animals?

Who rears them?

Which part of the animals yield the yarn? How is the yarn extracted?

What kinds of clothes help us to keep warm?

What is heat?

What is the meaning of 'cool'/'cold' and 'warm' hot?

How does heat flow from/to our body to / from the surroundings?

Different kinds of materials

Why does turmeric stain become red on applying soap?

How things change/react with one another

What gets deposited on a *tawa/khurpi/kudal* if left in a moise state?

Why does the exposed surface of a cut brinjal become black?

Why is seawater salty? Is it possible to separate salt from seawater?

3. The World of the Living

Surroundings affect the living

Why are nights cooler? How does having winters and summers affect soil? Are all soils similar? Can we make a pot similar? Can we make a pot with sand? Is soil similar when you dig into the ground? What happens to water when it falls on the cemented/bare ground?

The breath of life

Why do we/animals breathe? Do plants also breathe? Do they also respire? How do plants / animals live in water?

Movement of substances

How does water move in plants? How is food transported in plants?

Why do animals drink water? Why do we sweat? Why and how is there blood in all part of the body? Why is

blood red? Do all animals have blood? What is there in urine?

Multiplication in plants

Why are some plant parts like potato, onion swollen - are they of any use to the plants? What is the function of flowers?

How are fruits and seed formed? How are they dispersed?

4. Moving Things, People and Ideas

Moving objects

Why do people feel the need to measure time?

How do we know how fast something is moving?

5. How Things Work

Electric current and circuits

How can we conveniently represent an electric circuit?

Why does a bulb get hot?

How does a fuse work?

How does the current in a wire affect the direction of a compass needle?

What is an electromagnet?

How does an electric bell work?

6. Natural Phenomena

Rain, thunder and lightning

What causes storms? What are the effects of storms? Why are roofs blown off?

Light

Can we see a source of light through a bent tube?

How can we throw sunlight on a wall?

What things given image that are magnified or diminished in size?

How can we make a coloured disc appear white?

7. Natural Resources

Scarcity of water

Where and how do you get water for your domestic needs? Is it enough? Is there rough water for agricultural needs? What happens to plants when there is not enough water for plants? Where does a plant go when it dies?

Forest products

What are the products we get from forests? Do other animals also benefit from forests? What will happen if forests disappear?

Waste Management

Where does dirty water from your house go? Have you seen a drain? Does the water stand in it sometimes? does this have any harmful effect?

CLASS VIII

Food

Crop production

Crop production : How are different food crops produced?

What are the various foods we get from animal sources?

Micro-organism

What living organisms do we see under a microscope in a drop of water? What helps make curd? How does food to bad? How do we preserve food?

2. Materials

Materials in daily life

Are some of our clothes synthetic? How are they made? Where do the raw materials come from?

Do we use other materials that are synthetic?

Do we use cloth (fabric) for purposes other than making clothes to wear? What kind of fabric do we see around us?

What are they used for?

Different kinds of materials and their reaction.

Can a wire be drawn out of wood?

Do copper or aluminium also rust like iron?

What is the black material inside a pencil?

Why are electrical wires made of aluminium or copper?

How things change/react with one another

What happens to the wax when a candle is burnt? Is it possible to get this wax back?

What happens to kerosene/natural gas when it is burnt?

Which fuel is the best? Why?

3. The World of the Living

Why conserve

What are reserve forests/sanctuaries etc? How do we keep track of our plants and animals? How do we know that some species are in danger of disappearing?

What would happen if you continuously cut trees?

The cell

What is the internal structure of a plant what will we see if we look under the microscope? Which cells from our bodies can be easily seen? Are all cells similar?

How babies are formed

How do babies develop inside the mother? Why does our body change when we reach our teens? How is the sex of the child determined? Who looks after the babies in your homes? Do all animals give birth to young ones?

4. Moving things, People and Ideas

Idea of force

What happens when we push or pull anything?

How can we change the speed, direction of a moving object?

How can we change the shape of an object?

Friction

What makes a ball rolling on the ground slow down?

Pressure

Why are needles made pointed? Why does a balloon burst if too much air is blown into it? Why does an inverted glass/bottle/pitcher resist being pushed down into water? How can air/liquids exert pressure?

Sound

How do we communicate through sound? How is sound produced? What characterises different sounds?

5. How Thing Work

Electric current and circuits

Why do we get a shock when we touch an electric appliance with wet hands?

What happens to a conducting solution when electric current flows through it?

How can we coat an object with a layer of metal?

6. Natural Phenomena

Rain, thunder and lightning

What is lightning? What safety measures should we take against lightning strikes?

Light

What are the differences between the image formed on a new utensil and an old one? Why is there this difference?

When you see your image in the mirror it appears as if the left is on the right why?

Why don't we see images on all surfaces around us?

What makes things visible?

How do we see image of our back in a mirror?

Why do we sometimes see colours on oil films on water?

What is inside our eye that enables us to see?

Why are some people unable to see?

Night sky

What do we see in the sky at night? How can we identify stars and planets?

Earthquakes

What happens during an earthquake? What can we do to minimise its effects?

7. Natural Resources

Man's intervention in phenomena of nature

What do we do with wood?

What if we had no wood?

What will happen it we go on cutting trees / grass without limit?

What do we do with coal and petroleum?

Can we create coal and petroleum artificially?

Pollution of air and water

What are the various activities by human beings that make air impure?

Does clear, transparent water indicate purity?

CLASS IX

Matter in our surroundings –

Characteristics and states of matter, Change of state and Evaporation

The fundamental unit of Life – Structure of a cell, cell organelles

Motion – Uniform and Non-Uniform motion, distance-displacement, velocity and acceleration

Is matter around us pure –

Mixtures, types of mixtures, solution, colloids, suspension

Methods of separation of mixtures, compounds, element, physical and chemical change

Tissues –

Types of plant tissues and animal tissues

Force and Laws of Motion –

Force, definition and its effects, three laws of motion, mass, Inertia and conservation of momentum

Atoms and Molecules –

Laws of Chemical combination, Definition of atoms and molecules, Chemical formulae.

Diversity In Living Organisms – Classification of plants

Classification of animals and nomenclature.

Gravitation –

Universal law of gravitation, free - fall, mass and weight.

Thrust and pressure, Archimedes principle, relative density.

Structure of Atom –

Atomic number, Mass number, Valency, Isotopes and Isobars

Electronic Distribution – Rutherford's Model and Bohr Model.

Diseases and its causes

Infectious and Non-infectious diseases,

Principles of treatment and prevention

Work and Energy –

Work done by a force, power and energy

Kinetic energy and potential energy, laws of conservation of energy

Natural Resources –

Air, water and soil, pollution of air and water.

Nitrogen Cycle, Carbon cycle, Water cycle, Oxygen cycle, Green House Effect, Ozone layer.

Sound –

Propagation of sound – longitudinal and transverse waves.

Characteristics of sound waves, structure of human ear (qualitative), Multiple reflection of sound application of ultrasound

Improvement in food resources –

Improvement in crop yield, Manure and fertilizers, cropping patterns, animal husbandry, poultry and fish farming, bee-keeping.

CLASS X

Chemical Reactions & Equations-

Chemical Equations Types of chemical reactions.

To observe following reactions:-

i. Burning of Mg ribbon

ii. Reaction of Zn granules with dil HCl.

iii. Formation of slaked lime by the reaction of CaO with water.

iv. Heating crystals of $FeSO_4$ or $CuSO_4$ & $Pb(NO_3)_2$

v. Reaction of $CuSO_4$ solution and iron nails dipped in it

vi. Reaction between Sodium Sulphate solution and Barium Chloride solution.

vii. Oxidation of Cu to CuO.

Chemical Reactions & Equations

Corrosion, Rancidity

i. To observe corrosion in different metals such as Iron, Aluminum, Copper, Silver etc.

ii. To observe the rusting of Iron and conditions necessary for it.

iii. To observe the changes in colour odour, etc. in cut fruits & vegetables.

Acids, Bases & salts

Chemical properties of acids & Bases

Common properties of acids & bases

i. Identification of Acids & bases using different indicators.

ii. Passing CO_2 through $Ca(OH)_2$ solution.

iii. Reaction of Metal carbonates and bicarbonates with acids.

iv. Titration of acid with base using phenolphthalein.

v. Preparation of HCl from NaCl and conc. H_2SO_4 acid.

Strength of Acids & Base solutions,

Importance of pH value, more about salts, Chemicals from common salts

i- To test the pH value of different solutions and soil.

ii- Test pH of different salts To Find pH of the following samples by using pH paper /universal indicator –dil HCl, NaOH, Ethanoic acid, lemon juice, water, $NaHCO_3$

Life Process

What are life processes, Nutrition, Respiration, Transportation Excretion

i. To show that chlorophyll is essential for photosynthesis.

ii. Testing presence of CO_2 in exhaled air.

iii. To observe transpiration in plants.

iv. To study the Excretion system of man with the help of a chart.

To show that CO_2 is given out during respiration.

To prepare a temporary mount leaf to show its stomata.

To show that light is necessary for photosynthesis.

Light – Reflection & Refraction

Reflection of light, Spherical mirrors

i. To study the images formed on both sides of shining spoon.

To determine the focal length of concave mirror by obtaining the image of a distant object.

Refraction of Light

i. To study the images formed through spherical lenses of object kept at different distances.

To determine the focal length of convex lens by obtaining the image of a distant object.

To trace the path of a ray of light passing through glass slab.

Human Eye & the colourful world

Human eye, defects of vision and their correction, refraction of light through a prism.

Dispersion of white light by glass prism, atmospheric refraction, scattering of light

i. To study the parts of human eye with the help of model of human eye.

ii. To identify the students in the class with eye defects and to suggest correction of vision with nutritional remedy.

ii. To study the path of light passing through prism.

iv. To study the dispersion of white light by glass prism.

v. To study scattering of light in colloidal solution.

Metals and Non metals

Physical and chemical properties of metals, Reaction of metals and nonmetals, occurrence of metals, corrosion

i. To Observe physical properties of metals such as Fe, Zn, and Cu and non metals such as graphite, Sulphur, Iodine.

ii. To test conductivity through metals.

iii. To test the chemical properties of metal oxides and non metal oxides.

iv. To study the chemical reactions of metals with water, acids and solutions of other metal salts.

v. To study reactivity series.

vi. To investigate the conditions under which iron rusts.

To observe action of Zn, Fe, Cu, Al on $ZnSO_4$, $FeSO_4$, $CuSO_4$, $Al_2(SO_4)_3$.

To prepare SO_2 gas and observe colour ,solubility in water, effect on litmus paper, action of $K_2Cr_2O_7$

Control and coordination

Animals – Nervous system, coordination in plants, hormones and animals

i. To observe reflex action in one's body

ii. To observe the functioning of taste buds.

iii. To study parts of brain with the help of model/ chart.

iv. To study tropism in plants.

v. To study Endocrine glands in man with the help of chart.

Electricity

Electric current and circuit, electric potential and potential difference circuit diagram, Ohm's law

i. To prepare a simple circuit

ii . To study symbols of different components of a circuit.

iii. To observe & learn to use instruments such as ammeter and voltmeter and learn to calculate their least counts.

Factors on which the resistance of a conductor depends, resistance of a system of resistors, heating effect of electric current, electric power

To determine the equivalent resistance of two resistors in series and in parallel.

Magnetic effects of electric current

Magnetic field and Magnetic lines, magnetic field current carrying conductor, force on a current carrying conductor in a magnetic field, electric motor

i. To observe pattern formed by iron fillings around magnet.

ii. To observe magnetic lines around a bar magnet with the help of a compass needle.

iii. To observe magnetic field around a wire carrying current & change the direction of deflection with change of current direction.

iv. To observe the magnetic field around current carrying loop.

Magnetic effects of electric current

Electro magnetic induction, electric generator, domestic electric circuit

1. To set up current in the coil circuit with the help of moving magnet

Carbon and its compounds-

Bonding in carbon-the covalent bond, versatile nature of carbon

i. To study the arrangement of atoms in allotrophs of carbon (Ball and stick model).

Chemical properties of carbon compounds, Important carbon compounds-

Ethanol and Ethanoic acid, soaps and detergents.

i. To observe the burning of carbon compounds like camphor

ii. To show cleansing action of soaps and detergent.

i. To study the following properties of acetic acid

a) Odour

b) Solubility in water

c) Effect on litmus

d) Reaction with $NaHCO_3$

How do organism reproduce

Modes of reproduction by single organism, variation in off springs, sexual reproduction

i. To observe formation of mould on bread.

ii. To observe different tissues in spirogyra filaments.

iii. To observe leaf for budding in bryophylum

iv. To study sexual reproduction in flowering plants & human beings with the help of chart paper.

To study

i. Binary fission in amoeba

ii. Budding in yeast with the help of prepared slides.

iii. To study the amount of water absorbed by raisins.

Heredity and Evolution

Accumulation of variation during reproduction, heredity, evolution

i. To study the works of Mendel (1822-1884) with the help of internet

Evolution, speciation, evolution and classification, evolution should not be equated with progress

i. To study the works of Charles Darwin (1809-1882) with the help of internet.

ii. To find out about homologous organs in different

animal species

Periodic classification of elements

Attempts at classification of elements, Mendleef's periodic table, Modern periodic table.

i. To study the different classification made by different scientists.

ii. To study Mendleef's periodic table & Modern periodic table.

Sources of energy

Good source of energy, conventional source of energy, non conventional source of energy, environmental consequences

i. List different forms of energy used by us.

ii. To learn about different types of power plants.

iii. To prepare and study the structure and working of solar cooker & heater.

iv. To find out how energy sources affect environment.

v. To study the factors that lead to Global Warming.

Our Environment

Ecosystem – what are its component, food chains and food webs, how do our activities affect the environment

i. To collect the waste and categorize it into biodegradable and non-biodegradable substances.

ii. To design an aquarium and study it.

iii. To find out the chemicals responsible for depletion of ozone layer with the help of relevant books, internet or newspaper.

iv. To calculate the amount of waste generated in school and at home.

Management of Natural Resources

Need to manage our resources, Water for all,

i. To find out about the international norms to regulate the emission of CO_2.

ii. To find out the extent of pollution of Ganga and Yamuna rivers with the help of internet and the measures being taken to clean it.

iii. To check the pH of water supply of your house.

Coal and petroleum, an overview of natural resources management

i. To find out about any two forest produce that are basis of an industry

ii. To study the rainfall pattern in India from atlas.

iii. To study water harvesting system.

iv. To find out about Euro I and Euro II norms for emission from vehicles

CLASS XI
PHYSICS

Physical World and Measurement

Physics - scope and excitement; nature of physical laws; Physics, technology and society. Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures. Dimensions of physical quantities, dimensional analysis and its applications.

Kinematics

Frame of reference. Motion in a straight line: Position-time graph, speed and velocity. Uniform and non-uniform motion, average speed and instantaneous velocity. Uniformly accelerated motion, velocity-time, position-time graphs, relations for uniformly accelerated motion (graphical treatment). Elementary concepts of differentiation and integration for describing motion. Scalar and vector quantities: Position and displacement vectors, general vectors and notation, equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors. Relative velocity. Unit vector; Resolution of a vector in a plane - rectangular components. Motion in a plane. Cases of uniform velocity and uniform acceleration-projectile motion. Uniform circular motion.

Laws of Motion

Intuitive concept of force. Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion. Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces. Static and kinetic friction, laws of friction, rolling friction. Dynamics of uniform circular motion; Centripetal force, examples of circular motion (vehicle on

level circular road, vehicle on banked road).

Work, Energy and Power

Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power. Notion of potential energy, potential energy of a spring, conservative forces: conservation of mechanical energy (kinetic and potential energies); non-conservative forces: elastic and inelastic collisions in one and two dimensions.

Motion of System of Particles and Rigid Body

Centre of mass of a two-particle system, momentum conversation and centre of mass motion. Centre of mass of a rigid body; centre of mass of uniform rod. Vector product of vectors; moment of a force, torque, angular momentum, conservation of angular momentum with some examples. Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions; moment of inertia, radius of gyration. Values of moments of inertia for simple geometrical objects (no derivation). Statement of parallel and perpendicular axes theorems and their applications.

Gravitation

Kepler's laws of planetary motion. The universal law of gravitation. Acceleration due to gravity and its variation with altitude and depth. Gravitational potential energy; gravitational potential. Escape velocity. Orbital velocity of a satellite. Geo-stationary satellites.

Properties of Bulk Matter

Elastic behaviour, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear, modulus of rigidity. Pressure due to a fluid column; Pascal's law and its applications (hydraulic lift and hydraulic brakes). Effect of gravity on fluid pressure. Viscosity, Stokes' law, terminal velocity, Reynold's number, streamline and turbulent flow. Bernoulli's theorem and its applications.

Surface energy and surface tension, angle of contact, application of surface tension ideas to drops, bubbles and capillary rise. Heat, temperature, thermal expansion; specific heat - calorimetry; change of state - latent heat. Heat transfer-conduction, convection and radiation, thermal conductivity, Newton's law of cooling.

Thermodynamics

Thermal equilibrium and definition of temperature (zeroth law of thermodynamics). Heat, work and internal energy. First law of thermodynamics. Second law of thermodynamics: reversible and irreversible processes. Heat engines and refrigerators.

Behaviour of Perfect Gas and Kinetic Theory

Equation of state of a perfect gas, work done on compressing a gas. Kinetic theory of gases - assumptions, concept of pressure. Kinetic energy and temperature; rms speed of gas molecules; degrees of freedom, law of equipartition of energy (statement only) and application to specific heats of gases; concept of mean free path, Avogadro's number.

Oscillations and Waves

Periodic motion - period, frequency, displacement as a function of time. Periodic functions. Simple harmonic motion (S.H.M) and its equation; phase; oscillations of a spring–restoring force and force constant; energy in S.H.M.-kinetic and potential energies; simple pendulum–derivation of expression for its time period; free, forced and damped oscillations (qualitative ideas only), resonance.

Wave motion. Longitudinal and transverse waves, speed of wave motion. Displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler effect.

CHEMISTRY
Some Basic Concepts of Chemistry

General Introduction: Importance and scope of chemistry. Historical approach to particular nature of matter, laws of chemical combination. Dalton's atomic theory: concept of elements, atoms and molecules. Atomic and molecular masses. Mole concept and molar mass: percentage composition, empirical and molecular formula; chemical reactions, stoichiometry and calculations based on stoichiometry.

Structure of Atom

Discovery of electron, proton and neutron; atomic number, isotopes and isobars. Thomson's model and its limitations, Rutherford's model and its limitations, Bohr's model and its limitations, concept of shells and subshells, dual nature of matter and light, De Broglie's relationship, Heisenberg uncertainty principle, concept of orbitals, quantum numbers,

shapes of s, p, and d orbitals, rules for filling electrons in orbitals - Aufuau principle, Pauli exclusion principle and Hund's rule, electronic configuration of atoms, stability of half filled and completely filled orbitals.

Classification of Elements and Periodicity in Properties

Significance of classification, brief history of the development of periodic table, modern periodic law and the present form of periodic table, periodic trends in properties of elements -atomic radii, ionic radii, inert gas radii. Ionization enthalpy, electron gain enthalpy, electro negativity, valence.

Chemical Bonding and Molecular Structure

Valence electrons, ionic bond, covalent bond: bond parameters. Lewis structure, polar character of covalent bond, covalent character of ionic bond, valence bond theory, resonance, geometry of covalent molecules, VSEPR theory, concept of hybridization, involving s, p and d orbitals and shapes of some simple molecules, molecular orbital; theory of homo nuclear diatomic molecules (qualitative idea only), hydrogen bond.

States of Matter: gases and liquids

Three states of matter. Intermolecular interactions, type of bonding, melting and boiling points. Role of gas laws in elucidating the concept of the molecule, Boyle's law. Charles law, Gay Lussac's law, Avogadro's law. Ideal behaviour, empirical derivation of gas equation, Avogadro's number. Ideal gas equation. Derivation from ideal behaviour, liquefaction of gases, critical temperature.

Liquid State - Vapour pressure, viscosity and surface tension (qualitative idea only, no mathematical derivations).

Thermodynamics (Energetics)

Concepts Of System, types of systems, surroundings. Work, heat, energy, extensive and intensive properties, state functions. First law of thermodynamics - internal energy and enthalpy, heat capacity and specific heat, measurement of DU and DH, Hess's law of constant heat summation, enthalpy of: bond dissociation, combustion, formation, atomization, sublimation. Phase transition, ionization, and dilution. Introduction of entropy as a state function, free energy change for spontaneous and nonspontaneous process, equilibrium.

Equilibrium

Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium constant, factors affecting equilibrium - Le Chatelier's principle; ionic equilibrium - ionization of acids and bases, strong and weak electrolytes, degree of ionization, concept of pH. Hydrolysis of salts (elementary idea). Buffer solutions, solubility product, common ion effect (with illustrative examples).

Redox Reactions

Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions, applications of redox reactions.

Hydrogen

Position of hydrogen in periodic table, occurrence, isotopes, preparation, properties and uses of hydrogen; hydrides - ionic, covalent and interstitial; physical and chemical properties of water, heavy water; hydrogen peroxide-preparation, reactions and structure; hydrogen as a fuel.

s-Block Elements (Alkali and Alkaline earth metals)

Group 1 and Group 2 elements:

General introduction, electronic configuration, occurrence, anomalous properties of the first element of each group, diagonal relationship, trends in the variation of properties (such as ionization enthalpy, atomic and ionic radii), trends in chemical reactivity with oxygen, water, hydrogen and halogens; uses.

Preparation and properties of some important compounds:

Sodium carbonate, sodium chloride, sodium hydroxide and sodium hydrogen carbonate, biological importance of sodium and potassium. CaO, CaCO3 and industrial use of lime and limestone, biological importance of Mg and Ca

Some p-Block Elements

General Introduction to p-Block Elements

Group 13 elements: General introduction, electronic configuration, occurrence. Variation of properties, oxidation states, trends in chemical reactivity, anomalous properties of first element of the group; Boron- physical and chemical properties, some important compounds: borax, boric acids, boron hydrides. Aluminium: uses, reactions with acids and alkalies.

Group 14 elements: General introduction, electronic

configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous behaviour of first element, Carbon - catenation, allotropic forms, physical and chemical properties; uses of some important compounds: oxides.

Important compounds of silicon and a few uses: silicon tetrachloride, silicones, silicates and zeolites.

Organic Chemistry - Some Basic Principles and Techniques

General introduction, method, qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds Electronic displacements in a covalent bond: inductive effect, electromeric effect, resonance

and hyper conjugation. Homolytic and heterolytic fission of a covalent bond: free radicals, carbocations,

carbanions; electrophiles and nucleophiles, types of organic reactions

Hydrocarbons

Classification of hydrocarbons

Alkanes - Nomenclature, isomerism, conformations (ethane only), physical properties, chemical reactions including free radical mechanism or halogenation, combustion and pyrolysis.

Alkenes - Nomenclature, structure of double bond (ethene) geometrical isomerism, physical properties, methods of preparation; chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markovnikov's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition.

Alkynes - Nomenclature, structure of triple bond (ethyne), physical properties. Methods of preparation, chemical reactions: acidic character of alkynes, addition reaction of - hydrogen, halogens, hydrogen halides and water.

Aromatic hydrocarbons: Introduction, IUPAC nomenclature; Benzene: resonance aromaticity ; chemical properties: mechanism of electrophilic substitution. – nitration sulphonation, halogenation, Friedel Craft's alkylation and acylation: directive influence of functional group in mono-substituted benzene; carcinogenicity and toxicity.

BIOLOGY

Environmental Chemistry

Environmental pollution - air, water and soil pollution, chemical reactions in atmosphere, smog, major atmospheric pollutants; acid rain, ozone and its reactions, effects of depletion of ozone layer, greenhouse effect and global warming - pollution due to industrial wastes; green chemistry as an alternative tool for reducing pollution, strategy for control of environmental pollution.

Diversity in Living World

Diversity of living organisms

Classification of the living organisms (five kingdom classification, major groups and principles of classification within each kingdom). Systematics and binomial System of nomenclature Salient features of animal (non chordates up to phylum level and chordates up to class level) and plant (major groups; Angiosperms up to subclass) classification. Botanical gardens, herbaria, zoological parks and museums.

Structural Organisation in Animals and Plants

Tissues in animals and plants. Morphology, anatomy and functions of different parts of flowering plants: Root, stem, leaf, inflorescence, flower, fruit and seed. Morphology, anatomy and functions of different systems of an annelid (earthworm), an insect (cockroach) and an amphibian (frog).

Cell : Structure and Function

Cell: cell wall, cell membrane and cell organelles' (plastids, mitochondria, endoplasmic reticulum, Golgi bodies/dictyosomes, ribosomes, lysosomes, vacuoles, centrioles) and nuclear organization.

Mitosis, meiosis, cell cycle. Basic chemical constituents of living bodies. Structure and functions of carbohydrates, proteins, lipids and nucleic acids. Enzymes: types, properties and function.

Plant Physiology

Movement of water, food, nutrients and gases, Plants and Water Mineral nutrition, Respiration, Photosynthesis, Plant growth and development.

Human Physiology

Digestion and absorption.

Breathing and respiration.

Body fluids and circulation.

Excretory products and elimination.

Locomotion and movement.

Control and coordination.

CLASS XII
PHYSICS
Electrostatics

Electric Charges; Conservation of charges, Coulomb's law-force between two point charges, forces between multiple charges; superposition principle and continuous charge distribution. Electric field, electric field due to a point charge, electric field lines; electric dipole, electric field due to a dipole; torque on a dipole in uniform electric field. Electric flux, Gauss's theorem and its applications to find electric field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside). Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipole in an electrostatic field. Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarisation, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor.

Current Electricity

Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation with electric current; Ohm's law, electrical resistance, V-I characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity. Carbon resistors, colour code for carbon resistors; series and parallel combinations of resistors; temperature dependence of resistance. Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel. Kirchhoff's laws and simple applications. Wheatstone bridge, metre bridge. Potentiometer - principle and its applications to measure potential difference and for comparing emf of two cells; measurement of internal resistance of a cell.

Magnetic Effects of Current and Magnetism

Concept of magnetic field, Oersted's experiment. Biot - Savart law and its application to current carrying circular loop. Ampere's law and its applications to infinitely long straight wire, straight and toroidal solenoids. Force on a moving charge in uniform magnetic and electric fields. Cyclotron. Force on a current-carrying conductor in a uniform magnetic field. Force between two parallel current-carrying conductors-definition of ampere. Torque experienced by a current loop in uniform magnetic field; moving coil galvanometer-its current sensitivity and conversion to ammeter and voltmeter.

Current loop as a magnetic dipole and its magnetic dipole moment. Magnetic dipole moment of a revolving electron. Magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis. Torque on a magnetic dipole (bar magnet) in a uniform magnetic field; bar magnet as an equivalent solenoid, magnetic field lines; Earth's magnetic field and magnetic elements. Para-, dia- and ferro - magnetic substances, with examples. Electromagnets and factors affecting their strengths. Permanent magnets.

Electromagnetic Induction and Alternating Currents

Electromagnetic induction; Faraday's law, induced emf and current; Lenz's Law, Eddy currents. Self and mutual inductance. Need for displacement current. Alternating currents, peak and rms value of alternating current/voltage; reactance and impedance; LC oscillations (qualitative treatment only), LCR series circuit, resonance; power in AC circuits, wattless current.

AC generator and transformer.

Electromagnetic waves

Electromagnetic waves and their characteristics (qualitative ideas only). Transverse nature of electromagnetic waves. Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, Xrays, gamma rays) including elementary facts about their uses.

Optics

Reflection of light, spherical mirrors, mirror formula. Refraction of light, total internal reflection and its applications, optical fibres, refraction at spherical surfaces, lenses, thin lens formula, lens-maker's formula. Magnification,

power of a lens, combination of thin lenses in contact. Refraction and dispersion of light through a prism. Scattering of light - blue colour of the sky and reddish appearance of the sun at sunrise and sunset. Optical instruments: Human eye, image formation and accommodation, correction of eye defects (myopia, hypermetropia, presbyopia and astigmatism) using lenses. Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers. Wave optics: wave front and Huygens' principle, reflection and refraction of plane wave at a plane surface using wave fronts. Proof of laws of reflection and refraction using Huygens' principle. Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light. Diffraction due to a single slit, width of central maximum. Resolving power of microscopes and astronomical telescopes. Polarisation, plane polarised light; Brewster's law, uses of plane polarised light and Polaroids.

Dual Nature of Matter and Radiation

Dual nature of radiation. Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation-particle nature of light. Matter waves-wave nature of particles, de Broglie relation. Davisson-Germer experiment.

Atoms & Nuclei

Alpha-particle scattering experiment; Rutherford's model of atom. Bohr model, energy levels, hydrogen spectrum. Composition and size of nucleus, atomic masses, isotopes, isobars; isotones. Radioactivityalpha, beta and gamma particles/rays and their properties; radioactive decay law. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission and fusion.

Electronic Devices

Semiconductors; semiconductor diode – i-v characteristics in forward and reverse bias, diode as a rectifier; i-v characteristics of LED, photodiode, solar cell, and Zener diode; Zener diode as a voltage regulator. Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates (OR, AND, NOT, NAND and NOR). Transistor as a switch.

Communication Systems

Elements of a communication system (block diagram only); bandwidth of signals speech, TV and digital data); bandwidth of transmission medium. Propagation of electromagnetic waves in the atmosphere, sky and space wave propagation. Need for modulation. Production and detection of an amplitude-modulated wave.

CHEMISTRY
Solid State

Classification of solids based on different binding forces: molecular, ionic, covalent and metallic solids, amorphous and crystalline solids (elementary idea), unit cell in two dimensional and three dimensional lattices, calculation of density of unit cell, packing in solids, voids, number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties.

Solutions

Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, colligative properties – relative lowering of vapour pressure, elevation of B.P., depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass.

Electrochemistry

Redox reactions, conductance in electrolytic solutions, specific and molar conductivity variations of conductivity with concentration, Kohlrausch's Law, electrolysis and laws of electrolysis (elementary idea), dry cell – electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells, fuel cells; corrosion.

Chemical Kinetics

Rate of a reaction (average and instantaneous), factors affecting rates of reaction; concentration, temperature, catalyst; order and molecularity of a reaction; rate law and specific rate constant, integrated rate equations and half life (only for zero and first order reactions); concept of collision theory (elementary idea, no mathematical treatment)

Surface Chemistry

Adsorption – physisorption and chemisorption; factors affecting adsorption of gases on solids; catalysis : homogenous and heterogeneous, activity and selectivity: enzyme catalysis; colloidal state: distinction between true solu-

tions, colloids and suspensions; lyophilic, lyophobic, multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsion – types of emulsions.

General Principles and Processes of Isolation of Elements

Principles and methods of extraction - concentration, oxidation, reduction electrolytic method and refining; occurrence and principles of extraction of aluminium, copper, zinc and Iron.

p-Block Elements

Group 15 elements: General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; nitrogen - preparation, properties and uses; compounds of nitrogen: preparation and properties of ammonia and nitric acid, oxides of nitrogen (structure only); Phosphorous-allotropic forms; compounds .of phosphorous: preparation and properties of phosphine, halides (PCl3, PCl5) and oxoacids

(elementary idea only)

Group 16 elements: General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; dioxygen: preparation, properties and uses; simple oxides; Ozone. Sulphur - allotropic forms; compounds of sulphur: preparation, properties and uses of sulphur dioxide; sulphuric acid: industrial process of manufacture, properties and uses, oxoacids of sulphur (structures only).

Group 17 elements: General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; compounds of halogens: preparation, properties and uses of chlorine and hydrochloric acid, interhalogen compounds, oxoacids of halogens (structures only).

Group 18 elements: General introduction, electronic configuration. Occurrence, trends in physical and chemical properties, uses.

d and f Block Elements

General introduction ,electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first row transition metals – metallic character, ionization enthalpy, oxidation states, ionic radii, colour catalytic property, magnetic properties, interstitial compounds, alloy formation. Preparation and properties of K2Cr2O7 and KMnO4.

Lanthanoids - electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction.

Actinoids - Electronic configuration, oxidation states.

Coordination Compounds

Coordination compounds - Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds. bonding; isomerism, importance of coordination compounds (in qualitative analysis, extraction of metals and biological systems).

Haloalkanes and Haloarenes

Haloalkanes: Nomenclature, nature of C-X bond, physical and chemical properties, mechanism of substitution reactions.

Haloarenes: Nature of C-X bond, substitution reactions (directive influence of halogen for monosubstituted compounds only) Uses and environmental effects of - dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.

Alcohols, Phenols and Ethers

Alcohols: Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only); identification of primary, secondary and tertiary alcohols; mechanism of dehydration, uses, some important compounds - methanol and ethanol. **Phenols :** Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophillic substitution reactions, uses of phenols.

Ethers: Nomenclature, methods of preparation, physical and chemical properties, uses.

Aldehydes, Ketones and Carboxylic Acids

Aldehydes and Ketones: Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties, and mechanism of nucleophilic addition, reactivity of alpha hydrogen in aldehydes; uses.

Carboxylic Acids: Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.

Organic compounds containing Nitrogen

Amines: Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary, secondary and tertiary amines.

Cyanides and Isocyanides - will be mentioned at relevant places in context.

Diazonium salts: Preparation, chemical reactions and importance in synthetic organic chemistry.

Biomolecules

Carbohydrates - Classification (aldoses and ketoses), monosaccharides (glucose and fructose), oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen); importance.

Proteins - Elementary idea of a - amino acids, peptide bond, polypeptides proteins, primary structure, econdary structure, tertiary structure and quaternary structure (qualitative idea only), denaturation of proteins; enzymes.

Vitamins -Classification and functions.

Nucleic Acids: DNA & RNA .

Polymers Classification - natural and synthetic, methods of polymerization (addition and condensation), copolymerization. Some important polymers: natural and synthetic like polythene, nylon, polyesters

BIOLOGY

Sexual Reproduction

Pollination and fertilization in flowering plants. Development of seeds and fruits. Human reproduction: reproductive system in male and female, menstrual cycle. Production of gametes, fertilization, implantation, ,embryo development, pregnancy and parturition. Reproductive health - birth control, contraception and sexually transmitted diseases.

Genetics and evolution

Mendelian inheritance. Chromosome theory of inheritance, deviations from Mendelian ratio (gene interaction- Incomplete dominance, co-dominance, complementary genes, multiple alleles). Sex determination in human beings: XX, XY. Linkage and crossing over. Inheritance pattern of haemophilia and blood groups in human beings. DNA: replication, transcription, translation. Gene expression and regulation. Genome and Human Genome Project. DNA fingerprinting. Evolution: Theories and evidences.

Biology and Human welfare

Animal husbandry. Basic concepts of immunology, vaccines. Pathogens, Parasites. Plant breeding, tissue culture, food production. Microbes in household food processing, industrial production, sewage treatment and energy generation. Cancer and AIDS. Adolescence and drug/alcohol abuse.

Biotechnology and its Applications

Recombinant DNA technology. Applications in Health, Agriculture and Industry Genetically modified (GM) organisms; biosafety issues. Insulin and Bt cotton

Ecology & Environment

Ecosystems: components, types and energy flow. Species, population and community. Ecological adaptations. Centres of diversity and conservation of biodiversity, National parks and sanctuaries. Environmental issues.

MATHEMATICS

SYLLABUS GUIDELINES
Based on CBSE, ICSE & GCSE Syllabus & NCF guidelines devised by NCERT

CLASS I

1. **Geometry**
   SHAPES & SPATIAL UNDERSTANDING
   - Develops and uses vocabulary of spatial relationship (Top, Bottom, On, Under, Inside, Outside, Above, Below, Near, Far, Before, After)
   SOLIDS AROUNDS US
   - Collects objects from the surroundings having different sizes and shapes like pebbles, boxes, balls, cones, pipes, etc.
   - Sorts, Classifies and describes the objects on the basis of shapes and other observable properties.
   - Observes and describes the way shapes affect movements like rolling and sliding.
   - Sorts 2-D shapes such as flat objects made of card etc.

2. **Numbers**

DEVELOPINGS A SENSE OF NUMBERNESS, COUNTING AND OPERATIONS OF NUMBERS 1-9 AND ZERO

- Observes object and makes collections of objects.
- Arranges the collection of objects in order by
  – Matching and
  – One to one correspondence
- Counts the number of objects in a collection.
- Makes collection of objects corresponding to a specific number.
- Recognises and speaks numbers from 1 to 9.
- Uses numbers from 1 to 9 in counting and comparison. (Real objects and repeated events like clapping to be used for counting)
- Reads and writes numerals from 1 to 9.
- Adds and subtracts using real objects and pictures.
- Adds and subtracts the numbers using symbols '+' and '–'.
- Approaches zero through the subtraction pattern (such as $3 – 1 = 2$, $3 – 2 = 1$, $3 – 3 = 0$).

NUMBERS FROM (10-20)

- Forms Number sequence from 10 to 20.
- Counts objects using these numbers.
- Groups objects into a group of 10s and single objects.
- Develops the vocabulary of group of 'tens' and 'ones'.
- Shows the group of tens and ones by drawing.
- Counts the number of tens and ones in a given number.
- Writes the numerals for eleven to nineteen.
- Writes numerals for ten and twenty.
- Compares numbers upto 20.

ADDITION AND SUBTRACTION (UPTO 20)

- Adds and subtracts numbers upto 20.

NUMBERS FROM 21-99

- Writes numerals for Twentyone to Ninety nine. Groups objects into tens and ones.
- Draws representation for groups of ten and ones.
- Groups a number orally into tens and ones.

MENTAL ARITHMETIC

- Adds two single digit numbers mentally.

3. **Money**
   - Identifies common currency notes and coins.
   - Puts together small amounts of money.

4. **Measurement**
   LENGTH
   - Distinguishes between near, far, thin, thick, longer/taller, shorter, high, low.
   - Seriates objects by comparing their length.
   - Measures short lengths in terms of nonuniform units (in the context of games e.g. 'Gilli Danda' and 'marble games').
   - Estimates distance and length and verifies using non-uniform units (e.g. hand span etc.)
   WEIGHT
   - Compares between heavy and light objects.

5. **Time**
   - Distinguishes between events occurring in time using terms earlier and later.
   - Gets the qualitative feel of long & short duration, of school days v/s holidays.
   - Narrates the sequence of events in a day.

6. **Data Handling**
   - Collects, represents and interprets simple data such as measuring the arm length or circumference of the head using a paper strip.

7. **Patterns**
   - Describes sequences of simple patterns found in shapes in the surroundings and in numbers, e.g. stamping activity using fingers and thumb.

- Completes a given sequence of simple patterns found in shapes in the surroundings and in numbers.

CLASS II

1. Numbers
- Reads and writes numerals for numbers up to ninety nine.
- Expands a number with respect to place values.
- Counts and regroups objects into tens and ones.
- Uses the concept of place value in the comparison of numbers.
- Counts in various ways: Starting from any number, Group counting etc.
- Arranges numbers upto hundred in ascending and descending order.
- Forms the greatest and the smallest two digit numbers with and without repetition of given digits.
- Indicates and identifies the position of an object in a line.

2. Addition and Subtraction
- Adds and subtracts two digit numbers by drawing representations of tens and ones without and with regrouping.
- Adds zero to a number and subtracts zero from a number.
- Observes the commutative property of addition through patterns.
- Solves addition, subtraction problems presented through pictures and verbal description.
- Describes orally the situations that correspond to the given addition and subtraction facts.
- Estimates the result of addition and subtraction and compares the result with another given number.

3. Preparation for Multiplication & Division
- Discussion of situations involving repeated addition and situations involving equal sharing.
- Activities of making equal groups.

4. Mental Arithmetic
- Adds and subtracts single digit numbers mentally.
- Adds and subtracts multiples of ten mentally.

5. Money
- Identifies currency notes and coins.
- Puts together amounts of money not exceeding Rs 50/.
- Adds and subtracts small amounts of money mentally.
- Transacts an amount using 3 to 4 notes.

6. Measurement of Length
- Measures lengths & distances along short & long paths using uniform (non standard) units, extends to longer lengths.

7. Weight
- Compares two or more objects by their weight.
- Appreciates the need for a simple balance.
- Compares weights of given objects using simple balance.

8. Capacity (Volume)
- Compares and orders containers in terms of internal volume (capacity).
- Orders given containers as per their capacities on the basis of perception & verifies by pouring out etc.

9. Time
- Gets familiar with the days of the week and months of the year.
- Gets a feel for sequence of seasons (varying locally).
- Sequences the events occurring over longer periods in terms of dates/days.

10. Data Handling
- Collects data through measurement.
- Represents the data followed by discussion (e.g. heights of children).
- Collects and presents the data on birthdays.
- Draws inferences from the data at the appropriate level.

11. Patterns
- Observes and extends patterns in sequence of shapes and numbers.
- Searches for patterns in different ways of splitting a number.
- Creates block patterns by stamping thumb prints, leaf prints, vegetable prints, etc.
- Creates patterns of regular shapes by stamping.

12. Geometry Shapes & Spatial Understanding 3D and 2D Shapes
- Observes objects in the environment and gets a qualitative feel for their geometrical attributes.
- Identifies the basic 3D shapes such as cuboid, cylinder, cone, sphere by their names.
- Traces the 2D outlines of 3D objects.
- Observes and identifies these 2D shapes.
- Identifies 2D shapes viz., rectangle, square, triangle, circle by their names.
- Describes intuitively the properties of these 2D shapes.
- Identifies and makes straight lines by folding, straight edged objects, stretched strings and draws free hand and with a ruler.
- Draws horizontal, vertical and slant lines (free hand).
- Distinguishes between straight and curved lines.
- Identifies objects by observing their shadows.

CLASS III

1. Geometrical Shapes & Spatial Understanding.
- Creates shapes through paper folding, paper cutting.
- Identifies 2D shapes
- Describes the various 2D
- shapes by counting their sides, corners and diagonals.
- Makes shapes on the dotgrid using straight lines and curves.
- Creates shapes using tangram pieces.
- Matches the properties of two 2D shapes by observing their sides and corners (vertices).
- Tiles a given region using a tile of a given shape.
- Distinguishes between shapes that tile and that do not tile.
- Intuitive idea of a map. Reads simple maps (not necessarily scaled)
- Draws some 3D objects.

2. Numbers Number sequence upto 1000
- Reads and writes 3digit numbers.
- Expands a number w.r.t. place values.
- Counts in different ways starting from any number.
- Compares numbers.
- Forms greatest and smallest numbers using given digits.

3. Addition & Subtraction
- Adds and subtracts numbers by writing them vertically in the following two cases
  - without regrouping
  - with regrouping.
- Uses the place value in standard algorithm of addition and subtraction.
- Solves addition and subtraction problems in different situations presented through pictures and stories.
- Frames problems for addition and subtraction facts.
- Estimates the sum of, and difference between, two given numbers.

4. Multiplication
- Explains the meaning of multiplication (as repeated addition).
- Identifies the sign of multiplication.
- Constructs the multiplication tables of 2,3,4,5 and 10.
- Uses multiplication facts in situations.
- Multiplies two digit numbers using standard algorithm and Lattice multiplication algorithm.

5. Division
- Explains the meaning of division from context of equal grouping and sharing.
- Relates division with multiplication.
- Completes division facts – by grouping – by using multiplication tables.

6. Mental Arithmetic
- Adds and subtracts single digit numbers and two digit numbers mentally.
- Doubles two digit numbers mentally (result not exceeding two digits).

7. Money
- Converts Rupee to Paise using play money.
- Adds and subtracts amounts using column addition, and subtraction without regrouping.
- Makes rate charts and bills.

8. Measurement Length
- Appreciates the need for a standard unit.
- Measures length using appropriate standard units of length by choosing between centimetres and metres.
- Estimates the length of given object in standard units and verifies by measuring.
- Uses a ruler
- Relates centimetre and metre.

9. Weight
- Weighs objects using non standard units.
- Appreciates the conversion of weight.

10. Volume
- Measures and compares the capacity of different containers in terms of nonstandard units.
- Appreciates the conversion of volume.

11. Time
- Reads a calendar to find a particular day and date.
- Reads the time correct to the hour.
- Sequences the events chronologically.

12. Data Handling
- Records data using tally marks.
- Collects data and represents in terms of pictograph choosing appropriate scale and unit for display through pictographs.
- Draws conclusions from the data by discussing with the teacher.

13. Patterns
- Identifies simple symmetrical shapes and patterns.
- Makes patterns and designs from straight lines and other geometrical shapes.
- Identifies patterns in the numerals for odd and even numbers and in adding odd and even numbers.
- Partitions a number in different ways.
- Identifies patterns in his surroundings
- Identifies patterns in multiplication with, and dividing by 10s.

CLASS IV

1. Geometric Shapes & Spatial Understanding
- Draws a circle free hand and with compass.
- Identifies centre, radius and diameter of a circle.
- Uses Tangrams to create different shapes.
- Tiles geometrical shapes: using one or two shapes.
- Selects a tile among a given number of tiles that can tile a given region both intuitively and experimentally.
- Explores intuitively the area and perimeter of simple shapes.
- Makes 4 faced, 5 faced and 6 faced cubes from given nets especially designed for the same.
- Explores intuitively the reflections through inkblots, paper cutting and paper folding.
- Reads and draws 3D objects, making use of the familiarity with the conventions used in this.
- Draws intuitively the plane, elevation and side view of simple diagram.

2. Numbers and Operations
- Writes multiplication facts.
- Writes tables upto 10x10.
- Multiplies two and three digit numbers using

lattice algorithm and the standard (column) algorithm.

- Divides a given number by another number in various ways such as:
  - by drawing dots.
  - by grouping.
  - by using multiplication facts.
  - by repeated subtraction.
- Applies the four operations to life situations.
- Frames word problems.
- Estimates sums, differences and products of given numbers.

3. Mental Arithmetic

- Adds and subtracts multiples of 10 and 100, mentally.
- Completes multiplication facts by adding partial products, mentally (e.g. 7x 6 = 5 x 6+2 x 6).

4. Fractional Numbers

- Identifies half, one fourth and threefourths of a whole.
- Identifies the symbols, ½, ¼, ¾.
- Explains the meaning of ½ , ¼ and ¾ .
- Appreciates equivalence of 2/4 and 1/2 and of 2/2, 3/3, 4/4 and 1.

5. Money

- Converts Rupees to Paise.
- Adds and subtracts amounts using column addition and subtraction with regrouping.
- Uses operations to find totals, change, multiple costs and unit cost.
- Estimates roughly the totals and total cost.

6. Measurement Length

- Relates metre with centimetre.
- Converts metre into centimetres and vice versa.
- Solves problems involving length and distances.
- Estimates length of an object and distance between two given locations.

7. Weight

- Weighs objects using a balance and standard units.
- Determines sums and differences of weights.
- Estimates the weight of an object and verifies using a balance.

8. Volume

- Measures volumes of given liquid using containers marked with standard units.
- Determines sums and differences of volumes.
- Estimates the volume of a liquid contained in a vessel and verifies by measuring.

9. Time

- Computes the number of weeks in a year.
- Correlates the number of days in a year with the number of days in each month.
- Justifies the reason for the need of a leap year.
- Reads clock time to the nearest hours and minutes.
- Expresses time, using the terms, 'a.m.' and 'p.m.'
- Estimates the duration of familiar events.
- Finds approximate time elapsed by (to the nearest hour) forward counting.
- Computes the number of days between two dates.

10. Data Handling

- Collects data and represents in the form of bar graphs.
- Draws Inferences by discussing with the teacher.

11. Patterns

- Identifies patterns in multiplication and division, multiples of 9
- Casts out nines from a given number to check if it is a multiple of nine.
- Multiplies and divides by 10s, 100s.
- Identifies geometrical patterns based on symmetry.

CLASS V

1. Geometrical Shapes & Spatial Understanding

- Gets the feel of perspective while drawing a 3D object in 2D.
- Gets the feel of an angle through observation and paper folding.
- Identifies right angles in the environment.
- Classifies angles into right, acute and obtuse angles.
- Represents right angle, acute angle and obtuse angle by drawing and tracing.
- Explores intuitively rotations and reflections of familiar 2D shapes.
- Explores intuitively symmetry in familiar 3D shapes.
- Makes the shapes of cubes, cylinders and cones using nets especially designed for this purpose.

2. Numbers and operations

- Finds place value in numbers beyond 1000.
- Appreciates the role of place value in addition, subtraction and multiplication algorithms.
- Uses informal and standard division algorithms.
- Explains the meaning of factors and multiples.

3. Mental Arithmetic

- Estimates sums, differences, products and quotients and verifies using approximation.

4. Fractional Numbers

- Finds the fractional part of a collection.
- Compares fractions.
- Identifies equivalent fractions.
- Estimates the degree of closeness of a fraction to known fractions (½, ¼, ¾ etc.)
- Uses decimal fractions in the context of units of length and money.
- Expresses a given fraction in decimal notation and vice versa.

5. Money

- Applies the four operations in solving problems involving money.

6. Measurement

- Determines area and perimeter of simple geometrical figures.
- Applies the four operations in solving problems involving length, weight and volume.
- Relates commonly used larger and smaller units of length, weight and volume and converts one to the other.
- Applies simple fractions to quantities.
- Converts fractional larger unit into complete smaller units.
- Appreciates volume of a solid body: intuitively and also by informal measurement.
- Uses addition and subtraction in finding time intervals in simple cases.

7. Data Handling

- Collects two dimensional quantitative data.
- Represents the data in the form of a table.
- Draws a bar graph or a pictograph to present a data.

8. Patterns

- Identifies patterns in square numbers, triangular numbers.
- Relates sequences of odd numbers between consecutive square numbers.
- Makes border strip and tiling patterns.

9. Average, Percentage & Ratio Proportion

- Average of quantities.
- Finding quantities when ratio is given.
- Uses & application of percentage.

10. Profit and Loss

- Cost price & selling price

11. Circles, Triangles and Quadrilaterals

- Construction of circle
- Types of triangles.
- Types of quadrilaterals.

CLASS VI

NUMBER SYSTEM

(i) Knowing Numbers: Consolidating the *sense* of numberness upto 5 digits, Size, estimation of numbers, identifying smaller, larger, etc. Place value (recapitulation and extension), connectives: use of symbols =, <, > and use of brackets, word problems on number operations involving large numbers up to a maximum of 5 digits in the answer after all operations. This would include conversions of units of length and mass (from the larger to the smaller units), estimation of outcome of number operations. Introduction to a sense of the largeness of, and initial familiarity with, large numbers upto 8 digits and approximation (of large numbers)

(ii) Playing with Numbers: Simplification of brackets, Multiples and factors, divisibility rule of 2, 3, 4, 5, 6, 8, 9, 10, 11. (All these through observing patterns. Children would be helped in deducing some and then asked to derive some that are a combination of the basic patterns of divisibility.) Even/odd and prime/ composite numbers, Coprime numbers, prime factorization, every number can be written as products of prime factors. HCF and LCM, prime factorization and division method for HCF and LCM, the property LCM x HCF = product of two numbers. All this is to be embedded in contexts that bring out the significance and provide motivation to the child for learning these ideas.

(iii) Whole numbers: Natural numbers, whole numbers, properties of numbers (commutative, associative, distributive, additive identity, multiplicative identity), number line. Seeing patterns, identifying and formulating rules to be done by children. *(As familiarity with algebra grows, the child can express the generic pattern.)*

(iv) Negative Numbers and Integers: How negative numbers arise, models of negative numbers, connection to daily life, ordering of negative numbers, representation of negative numbers on number line. *Children to s*ee patterns, identify and formulate rules. What are integers, identification of integers on the number line, operation of addition and subtraction of integers, showing the operations on the number line (addition of negative integer reduces the value of the number) comparison of integers, ordering of integers.

(v) Fractions: Revision of what a fraction *is*, Fraction as a part of whole, Representation of fractions (pictorially and on number line), fraction as a division, proper, improper and mixed fractions, equivalent fractions, comparison of fractions, addition and subtraction of fractions (Avoid large and complicated unnecessary tasks). (Moving towards abstraction in fractions) Review of the idea of a decimal *fraction*, place value in the context of decimal *fraction*, inter conversion of fractions and decimal fractions (avoid recurring decimals at this stage), word problems involving addition and subtraction of decimals (two operations together on money, mass, length and temperature)

ALGEBRA

(i) Introduction to Algebra

- Introduction to variable through patterns and through appropriate word problems and generalizations (example 5x1=5 etc.)
- Generate such patterns with more examples.
- Introduction to unknowns through examples with simple contexts (single operations)

(ii) Ratio and Proportion

- Concept of Ratio • Proportion as equality of two ratios
- Unitary method (with only direct variation)
- Word problems

GEOMETRY

(i) Basic geometrical ideas (2 D): Introduction to geometry. Its linkage with and reflection in everyday experience.

- Line, line segment, ray
- Open and closed figures.
- Interior and exterior of *closed* figures.
- Curvilinear and linear *boundaries*
- Angle-Vertex, arm, interior and exterior,
- Triangle-vertices, sides, angles, interior and exterior, altitude and median
- Quadrilateral-Sides, vertices, angles, diagonals, adjacent sides and opposite sides (only convex quadrilateral are to be discussed), interior and exterior of a quadrilateral.
- Circle-Centre, radius, diameter, arc, sector, chord, segment, semicircle, circumference, interior and exterior.

(ii) Understanding Elementary Shapes
(2 D and 3 D)
- Measure of line segment
- Measure of angles
- Pair of lines
- Intersecting and perpendicular lines
- Parallel lines
- Types of angles-acute, obtuse, right, straight reflex, complete and zero angle
- *Classification* of triangles (*on the basis of* sides, and of angles)
- Properties of parallel lines with transversal (alternate, corresponding, interior, exterior angles)

MENSURATION
Concept of perimeter and introduction to area:
Introduction and general understanding *of perimeter* using many shapes. Shapes of different kinds with the same perimeter. Concept of area, Area of a rectangle and a square. *Counter examples to different misconcepts related to perimeter and area.* Perimeter of a rectangle – and its special case – a square. Deducing the formula of the perimeter for a rectangle and then a square through pattern and generalization.

DATA HANDLING
(i) What is data-choosing data to examine a hypothesis?
(ii) Collection and organisation of data examples of organising it in tally bars and a table.
(iii) Pictograph-Need for scaling in pictographs interpretation and construction.
(iv) Making bar graphs for given data interpreting bar graphs.

CLASS VII

Number System
(i) Knowing our Numbers: Integers
- Multiplication and division of integers (through patterns). Division by zero is meaningless
- Properties of integers (including identities for addition & multiplication, *commutative, associative, distributive*) through patterns. These would include examples from whole numbers as well. Involve expressing commutative and associative properties in a general form. Construction of counterexamples, including some by children. Counter examples like subtraction is not commutative.
- Word problems including integers (all operations).

(ii) Fractions and rational numbers:
- Multiplication of fractions
- Fraction as an operator
- Reciprocal of a fraction
- Division of fractions
- Word problems involving mixed fractions
- Introduction to rational numbers (with representation on number line)
- Operations on rational numbers (all operations)
- Representation of rational number as a decimal.
- Word problems on rational numbers (all operations)
- Multiplication and division of decimal fractions
- Conversion of units (lengths & mass)
- Word problems (including all operations)

(iii) Powers:
- Exponents (only natural numbers.)
- Laws of exponents (through observing patterns to

arrive at generalization.)

i. $a^m.a^n = a^{m+n}$
ii. $(a^m)^n = a^{mn}$
iii. $\dfrac{a^m}{a^n} = a^{m-n}$, where $m - n \in N$
iv. $a^m.b^m = (ab)^m$

Algebra

Algebraic Expressions
- Generate algebraic expressions (simple) involving one or two variables
- Identifying constants, coefficient, powers
- Like and unlike terms, degree of expressions e.g. xy^2 etc. (exponent $\leq$ 3 number of variables $\leq$ 2)
- Addition, subtraction of algebraic expressions (coefficients should be integers).
- Simple linear equations in one variable (in contextual problems) with two operations (avoid complicated coefficients).

Ratio and Proportion
- Ratio and proportion (revision)
- Unitary method continued consolidation, general expression.
- Percentagean introduction.
- Understanding percentage as a fraction with denominator 100
- Converting fractions and decimals into percentage and viceversa.
- Application to profit & loss (single transaction only)
- Application to simple interest (time period in complete years)

Geometry

(i) Understanding shapes:
- Pairs of angles (linear, supplementary, complementary, adjacent, vertically opposite) (verification and simple proof of vertically opposite angles)
- Properties of parallel lines with transversal (alternate, corresponding, interior, exterior angles).

(ii) Properties of triangles:
- Angle sum property (with notions of proof & verification through paper folding, proofs using property of parallel lines, difference between proof and verification.)
- Exterior angle property.
- Sum of two sides of a Δ > it's third side.
- Pythagoras Theorem (Verification only).

(iii) Symmetry
- Recalling reflection symmetry
- Idea of rotational symmetry, observations of rotational symmetry of 2D objects. (90°, 120°, 180°)
- Operation of rotation through 90° & 180° of simple figures.
- Examples of figures with both rotation and reflection symmetry (both operations)
- Examples of figures that have reflection and rotation symmetry and vice versa.

(iv) Representing 3D in 2D:
- Drawing 3D figures in 2D showing hidden faces.
- Identification & counting of vertices edges, faces, nets (for cubes cuboids, & cylinders, cones).
- Matching pictures with objects (Identifying names).
- Mapping the space around approximately through visual estimation.

(v) Congruence
- Congruence through superposition (examples-blades, stamps, etc.).
- Extend congruence to simple geometrical shapes e.g. triangles, circles.
- Criteria of congruence (by verification) SSS, SAS, ASA, RHS.

(vi) Construction (Using scale, protractor, compass)
- Construction of a line parallel to a given line from a point outside it.(Simple proof as remark with the reasoning of alternate angles)

- Construction of simple triangles. Like given three sides, given a side and two angles on it, given two sides and the angle between them.

Mensuration
- Revision of perimeter, Idea of π, Circumference of Circle.

Area
- Concept of measurement using a basic unit area of a square, rectangle, triangle, parallelogram and circle, area between two rectangles and two concentric circles.

Data handling
(i) Collection and organisation of data choosing the data to collect for a hypothesis testing.
(ii) Mean, median and mode of ungrouped data understanding what they represent.
(iii) Constructing bargraphs.
(iv) Feel of probability using data through experiments. Notion of chance in events like tossing coins, dice etc. Tabulating and counting occurrences of 1 through 6 in a number of throws. Comparing the observation with that for a coin. Observing strings of throws, notion of randomness.

CLASS VIII

Number System
(i) Rational Numbers:
- Properties of rational numbers. (including identities). Using general form of expression to describe properties.
- Consolidation of operations on rational numbers.
- Representation of rational numbers on the number line.
- Between any two rational numbers there lies another rational number (Making children see that if we take two rational numbers then unlike for whole numbers, in this case you can keep finding more and more numbers that lie between them.)
- Word problem (higher logic, two operations, including ideas like area)

(ii) Powers
- Integers as exponents.
- Laws of exponents with integral powers

(iii) Squares, Square roots, Cubes, Cube roots.
- Square and Square roots
- Square roots using factor method and division method for numbers containing (a) no more than total 4 digits and (b) no more than 2 decimal places
- Cubes and cubes roots (only factor method for numbers containing at most 3 digits)
- Estimating square roots and cube roots. Learning the process of moving nearer to the required number.

(iv) Playing with numbers
- Writing and understanding a 2 and 3 digit number *in generalized form* ($100a + 10b + c$, where a, b, c can be only digit 09) and engaging with various puzzles concerning this. (Like finding the missing numerals represented by alphabets in sums involving any of the four operations.) Children to solve and create problems and puzzles.
- Number puzzles and games
- Deducing the divisibility test rules of 2,3,5,9,10 for a two or three digit number expressed in the general form.

Algebra
(i) Algebraic Expressions
- Multiplication and division of algebraic exp.(Coefficient should be integers)
- Some common errors $2 + x \neq 2x$,
$7x + y \neq 7xy$
- Identities $(a \pm b)^2 = a^2 \pm 2ab + b^2$, $a^2 - b^2 = (a - b)(a + b)$ Factorisation (simple cases only) as examples of the following types $a(x + y)$, $(x \pm y)^2$, $a^2 - b^2$, $(x + a)(x + b)$
- Solving linear equations in one variable in contextual problems involving multiplication and division (word problems) (avoid complex coefficient in the equations).

Ratio and Proportion

- Slightly advanced problems involving applications on percentages, profit and loss, overhead expenses, discount, tax.
- Difference between simple and compound interest (compounded yearly upto 3 years or half yearly upto 3 steps only), Arriving at the formula for compound interest through patterns and using it for simple problems.
- Direct variation : Simple and direct word problems.
- Inverse variation : Simple and direct word problems.
- Time and work problems: Simple and direct word problems.

Geometry

(i) Understanding shapes

- Properties of quadrilaterals – Sum of angles of a quadrilateral is equal to 360°. (By verification)
- Properties of parallelogram (By verification)
- (i) Opposite sides of a parallelogram are equal,
- (ii) Opposite angles of a parallelogram are equal.
- (iii) Diagonals of a parallelogram bisect each other. [Why (iv), (v) and (v) follow from (ii)]
- (iv) Diagonals of a rectangle are equal and bisect each other.
- (v) Diagonals of a rhombus bisect each other at right angles.
- (vi) Diagonals of a square are equal and bisect each other at right angles.

(ii) Representing 3D in 2D

- Identify and Match pictures with objects [more complicated e.g. nested, joint 2D and 3D shapes (not more than 2)]
- Drawing 2D representation of 3D objects (Continued and extended)
- Counting vertices, edges and faces and verifying Euler's relation for 3D figures with flat faces (cubes, cuboids, tetrahedrons, prisms and pyramids).

(iii) Construction:

Construction of Quadrilaterals:

- Given four sides and one diagonal.
- Three sides and two diagonals.
- Three sides and two included angles.
- Two adjacent sides and three angles.

Mensuration

- (i) Area of a trapezium and a polygon.
- (ii) Concept of volume, measurement of volume using a basic unit, volume of a cube, cuboid and cylinder.
- (iii) Volume and capacity (measurement of capacity).
- (iv) Surface area of a cube, cuboid and cylinder.

Data handling

- (i) Ungrouped data, arranging it into groups, representation of grouped data through bargraphs, constructing and interpreting bargraphs.
- (ii) Simple Pie charts with reasonable data numbers
- (iii) Consolidating and generalising the notion of chance in events like tossing coins, dice etc. Relating it to chance in life events. Visual representation of frequency outcomes of repeated throws of the same kind of coins or dice. Throwing a large number of identical dice/coins together and aggregating the result of the throws to get large number of individual events. Observing the aggregating numbers over a large number of repeated events. Comparing with the data for a coin. Observing strings of throws, notion of randomness.

Introduction to graphs:

Preliminaries:

- (i) Axes (Same units), Cartesian Plane.
- (ii) Plotting points for different kind of situations (perimeter Vs length for squares, area as a function of side of a square, plotting of multiples of different numbers, simple interest Vs number of years etc.).
- (iii) Reading off from the graphs.
- Reading of linear graphs.
- Reading of distance vs time graph.

CLASS IX

UNIT I: NUMBER SYSTEMS

REAL NUMBERS

Review of representation of natural numbers, integers, rational numbers on the number line. Representation of terminating/ non-terminating recurring decimals, on the number line through successive magnification. Rational numbers as recurring/terminating decimals. Examples of non-recurring / non terminating decimals such as $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$ etc.

Existence of non-rational numbers (irrational numbers) such as $\sqrt{2}$, $\sqrt{3}$, and their representation on the number line. Explaining that every real number is represented by a unique point on the number line, and conversely, every point on the number line represents a unique real number.

Existence of $\sqrt{x}$ for a given positive real number x (visual proof to be emphasized). Definition of nth root of a real number.

Recall of laws of exponents with integral powers.

Rational exponents with positive real bases (to be done by particular cases, allowing learner to arrive at the general laws).

Rationalization (with precise meaning) of real numbers of the type (& their combinations) $\dfrac{1}{a+b\sqrt{x}}$ &

$\dfrac{1}{\sqrt{x}+\sqrt{y}}$ where x and y are natural

numbers and a, b are integers.

UNIT II: ALGEBRA

1. POLYNOMIALS

Definition of a polynomial in one variable, its coefficients, with examples and counter examples, its terms, zero polynomial. Degree of a polynomial. Constant, linear, quadratic, cubic polynomials; monomials, binomials, trinomials. Factors and multiples. Zeros/roots of a polynomial/equation.

Remainder Theorem with examples and analogy to integers. Statement and proof of the Factor Theorem.

Factorization of $ax^2 + bx + c$, $a \neq 0$ where a, b, c are real numbers, and of cubic polynomials using the Factor Theorem.

Recall of algebraic expressions and identities. Further identities of the type

$(x + y + z)^2$
$= x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$, $(x \pm y)^3$
$= x^3 \pm y^3 \pm 2xy (x \pm y)$,
$x^3 + y^3 + z^3 - 3xyz = (x + y + z)$
$(x^2 + y^2 + z^2 - xy - yz - zx)$ and their use in factorization of polynomials. Simple expressions reducible to these polynomials.

2. LINEAR EQUATIONS IN TWO VARIABLES

Recall of linear equations in one variable. Introduction to the equation in two variables. Prove that a linear equation in two variables has infinitely many solutions, and justify their being written as ordered pairs of real numbers, plotting them and showing that they seem to lie on a line. Examples, problems from real life, including problems on ratio and proportion and with algebraic and graphical solutions being done simultaneously.

UNIT III: COORDINATE GEOMETRY

1. COORDINATE GEOMETRY

The Cartesian plane, coordinates of a point, names and terms associated with the coordinate plane, notations, plotting points in the plane, graph of linear equations as examples; focus on linear equations of the type $ax + by + c = 0$ by writing it as $y = mx + c$ and linking with the chapter on linear equations in two

variables.

UNIT IV: GEOMETRY

1. INTRODUCTION TO EUCLID'S GEOMETRY

History – Euclid and geometry in India. Euclid's method of formalizing observed phenomenon into rigorous mathematics with definitions, common/ obvious notions, axioms/postulates, and theorems. The five postulates of Euclid.

Equivalent versions of the fifth postulate. Showing the relationship between axiom and theorem.

1. Given two distinct points, there exists one and only one line through them.
2. Two distinct lines cannot have more than one point in common.

2. LINES AND ANGLES

1. If a ray stands on a line, then the sum of the two adjacent angles so formed is 180° and the converse.
2. If two lines intersect, the vertically opposite angles are equal.
3. Results on corresponding angles, alternate angles, interior angles when a transversal intersects two parallel lines.
4. Lines, which are parallel to a given line, are parallel.
5. The sum of the angles of a triangle is 180°.
6. If a side of a triangle is produced, the exterior angle so formed is equal to the sum of the two interiors opposite angles.

3. TRIANGLES

1. Two triangles are congruent if any two sides and the included angle of one triangle is equal to any two sides and the included angle of the other triangle (SAS Congruence).
2. Two triangles are congruent if any two angles and the included side of one triangle is equal to any two angles and the included side of the other triangle (ASA Congruence).
3. Two triangles are congruent if the three sides of one triangle are equal to three sides of the other triangle (SSS Congruence).
4. Two right triangles are congruent if the hypotenuse and a side of one triangle are equal (respectively) to the hypotenuse and a side of the other triangle.
5. The angles opposite to equal sides of a triangle are equal.
6. The sides opposite to equal angles of a triangle are equal.
7. Triangle inequalities and relation between 'angle and facing side' inequalities in triangles.

4. QUADRILATERALS

1. The diagonal divides a parallelogram into two congruent triangles.
2. In a parallelogram opposite sides are equal, and conversely.
3. In a parallelogram opposite angles are equal and conversely.
4. A quadrilateral is a parallelogram if a pair of its opposite sides is parallel and equal.
5. In a parallelogram, the diagonals bisect each other and conversely.
6. In a triangle, the line segment joining the mid points of any two sides is parallel to the third side and its converse.

5. AREA

Review concept of area, recall area of a rectangle.

1. Parallelograms on the same base and between the same parallels have the same area.
2. Triangles on the same base and between the same parallels are equal in area and its converse.

6. CIRCLES

Through examples, arrive at definitions of circle related concepts, radius, circumference, diameter, chord, arc, subtended angle.

1. Equal chords of a circle subtended equal angles at the center and its converse.
2. The perpendicular from the center of a circle to a chord bisects the chord and conversely, the line drawn through the center of a circle to bisect a chord is

perpendicular to the chord.

3. There is one and only one circle passing through three given non-collinear points.

4. Equal chords of a circle (or of congruent circles) are equidistant from the center(s) and conversely.

5. The angle subtended by an arc at the center is double the angle subtended by it at any point on the remaining part of the circle.

6. Angles in the same segment of a circle are equal.

7. If a line segment joining two points subtends equal angle at two other points lying on the same side of the line containing the segment, the four points lie on a circle.

8. The sum of the either pair of the opposite angles of a cyclic quadrilateral is 180° and its converse.

7. CONSTRUCTIONS

1. Construction of bisectors of line segments & angles, 60°, 90°, 45° angles etc, equilateral triangles.

2. Construction of a triangle given its base, sum/difference of the other two sides and one base angle.

3. Construction of a triangle of given perimeter and base angles.

UNIT V: MENSURATION

1. AREAS

Area of a triangle using Hero's formula (without proof) and its application in finding the area of a quadrilateral.

2. SURFACE AREAS AND VOLUMES

Surface areas and volumes of cubes, cuboids, spheres (including hemispheres) and right circular cylinders/cones.

UNIT VI: STATISTICS & PROBABILITY

1. STATISTICS

Introduction to Statistics: Collection of data, presentation of data – tabular form, ungrouped/grouped, bar graphs, histograms (with varying base lengths), frequency polygons, qualitative analysis of data to choose the correct form of presentation for the collected data. Mean, median, mode of ungrouped data.

2. PROBABILITY

History, Repeated experiments and observed frequency approach to probability. Focus is on empirical probability. (A large amount of time to be devoted to group and to individual activities to motivate the concept; the experiments to be drawn from real - life situations, and from examples used in the chapter on statistics).

CLASS X

UNIT I: NUMBER SYSTEMS

1. REAL NUMBERS

Euclid's division lemma, Fundamental Theorem of Arithmetic - statements after reviewing work done earlier and after illustrating and motivating through examples.

Irrationality of $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$ decimal expansions of rational numbers in terms of terminating/non-terminating recurring decimals.

UNIT II: ALGEBRA

3. POLYNOMIALS

Zeros of a polynomial. Relationship between zeros and coefficients of a polynomial with particular reference to quadratic polynomials. Statement and simple problems on division algorithm for polynomials with real coefficients.

4. PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

Pair of linear equations in two variables. Geometric representation of different possibilities of solutions/inconsistency.

Algebraic conditions for number of solutions. Solution of pair of linear equations in two variables algebraically – by substitution, by elimination and by cross multiplication. Simple situational problems must be included. Simple problems on equations reducible to linear equations may be included.

5. QUADRATIC EQUATIONS

Standard form of a quadratic equation $ax^2 + bx + c = 0 (a \neq 0)$. Solution of the quadratic equations (only real roots) by factorization and by completing the square, i.e. by using quadratic formula. Relationship between discriminant and nature of roots. Problems related to day to day activities to be incorporated.

6. ARITHMETIC PROGRESSIONS

Motivation for studying AP. Derivation of standard results of finding the nth term and sum of first n terms.

UNIT III: TRIGONOMETRY

1. TRIGONOMETRIC RATIOS

Trigonometric ratios of an acute angle of a right-angled triangle. Proof of their existence (well defined); motivate the ratios, whichever are defined at 0° & 90°. Values (with proofs) of the trigonometric ratios of 30°, 45° & 60°. Relationships between the ratios.

2. TRIGONOMETRIC IDENTITIES

Proof and applications of the identity $\sin^2 A + \cos^2 A = 1$ Only simple identities to be given. Trigonometric ratios of complementary angles.

3. HEIGHTS AND DISTANCES

Simple and believable problems on heights and distances.

Problems should not involve more than two right triangle. Angles of elevation/depression should be only 30°, 45°, 60°.

UNIT IV: COORDINATE GEOMETRY

1. LINES (In two-dimensions)

Review the concepts of coordinate geometry done earlier including graphs of linear equations.

Awareness of geometrical representation of quadratic polynomials. Distance between two points and section formula (internal). Area of a triangle.

UNIT V : GEOMETRY

1. TRIANGLES

Definitions, examples, counter examples of similar triangles.

1. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then other two sides are divided in the same ratio.

2. If a line divides two sides of a triangle in the same ratio, the line is parallel to the third side.

3. If in two triangles, then the corresponding angles are equal, their corresponding sides are proportional then the triangles are similar.

4. If the corresponding sides of two triangles are proportional, their corresponding angles are equal then the two triangles are similar.

5. If one angle of a triangle is equal to one angle of another triangle and the sides including these angles are proportional, then the two triangles are similar.

6. If a perpendicular is drawn from the vertex of the right angle of a right triangle to the hypotenuse, the triangles on each side of the perpendicular are similar to the whole triangle and to each other.

7. The ratio of the areas of two similar triangles is equal to the ratio of the squares on their corresponding sides.

8. In a right triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.

9. In a triangle, if the square on one side is equal to sum of the squares on the other two sides, the angles opposite two the first side is a right triangle.

2. CIRCLES

Tangents to a circle motivated by chords drawn from points coming closer and closer to the point.

1. The tangent at any point of a circle is perpendicular to the radius through the point of contact.

2. The lengths of tangents drawn from an external point to circle are equal.

3. CONSTRUCTIONS

1. Division of a line segment in a given ratio (internally)

2. Tangent to a circle from a point outside it.

3. Construction of a triangle similar to a given triangle.

UNIT VI: MENSURATION

1. AREAS OF PLANE FIGURES

Motivate the area of a circle; area of sectors and segments of a circle. Problems based on areas and perimeter/circumference of the above said plane figures. (In calculating area of segment of a circle, problems should be restricted to central angle of 60°, 90° & 120° only. Plane figures involving triangles, simple quadrilaterals and circle should be taken.)

2. SURFACE AREAS AND VOLUMES

(i) Problems on finding surface areas and volumes of combinations of any two of the following: cubes, cuboids, spheres, hemispheres and right circular cylinders/cones. Frustum of a cone.

(ii) Problems involving converting one type of metallic solid into another and other mixed problems. (Problems with combination of not more than two different solids be taken.)

UNIT VII: STATISTICS & PROBABILITY

1. STATISTICS

Mean, median and mode of grouped data (bimodal situation to be avoided). Cumulative frequency graph.

2. PROBABILITY

Classical definition of probability. Connection with probability as given in Class IX. Simple problems on single events, not using set notation.

CLASS XI

UNIT-I: SETS AND FUNCTIONS

1. Sets:

Sets and their representations. Empty set. Finite & Infinite sets. Equal sets. Subsets. Subsets of the set of real numbers especially intervals (with notations). Power set. Universal set. Venn diagrams.

Union and Intersection of sets. Difference of sets. Complement of a set.

2. Relations & Functions:

Ordered pairs, Cartesian product of sets. Number of elements in the cartesian product of two finite sets. Cartesian product of the reals with itself (upto R R R ´´).

Definition of relation, pictorial diagrams, domain, co-domain and range of a relation.

Function as a special kind of relation from one set to another. Pictorial representation of a function, domain, co-domain & range of a function. Real valued function of the real variable, domain and

range of these functions, constant, identity, polynomial, rational, modulus, signum and greatest integer functions with their graphs. Sum, difference, product and quotients of functions.

3. Trigonometric Functions:

Positive and negative angles. Measuring angles in radians & in degrees and conversion from one measure to another. Definition of trigonometric functions with the help of unit circle. Truth of the

identity $\sin^2 x + \cos^2 x = 1$, for all x. Signs of trigonometric functions and sketch of their graphs.

Expressing sin $(x + y)$ and cos $(x + y)$ in terms of $\sin x$, $\sin y$, $\cos x$ & $\cos y$. Deducing the identities like following :

$$\tan(x \pm y) = \frac{\tan x \pm y}{1 \mp \tan x \times \tan y}$$

$$\cot(x \pm y) = \frac{\cot x \cot y \pm 1}{\cot x \mp \cot y}$$

$$\sin x + \sin y = 2 \sin \frac{x+y}{2} \cos \frac{x-y}{2}$$

$$\cos x + \cos y = 2 \cos \frac{x+y}{2} \cos \frac{x-y}{2}$$

$$\sin x - \sin y = 2 \cos \frac{x+y}{2} \sin \frac{x-y}{2}$$

$$\cos x = \cos y = -2 \sin \frac{x+y}{2} \sin \frac{x-y}{2}$$

Identities related to sin $2x$, cos$2x$, tan $2x$, sin$3x$, cos$3x$ and tan$3x$. General solution of trigonometric equations of

the type $\sin q = \sin a$, $\cos q = \cos a$ and $\tan q = \tan a$. Proofs and simple applications of sine and cosine formulae.

UNIT – II: ALGEBRA

1. Principle of Mathematical Induction:

Processes of the proof by induction, motivating the application of the method by looking at natural numbers as the least inductive subset of real numbers. The principle of mathematical induction and simple applications.

2. Complex Numbers and Quadratic Equations:

Need for complex numbers, especially $\sqrt{-1}$, to be motivated by inability to solve every quadratic equation. Brief description of algebraic properties of complex numbers.

Argand plane and polar representation of complex numbers. Statement of Fundamental Theorem of Algebra, solution of quadratic equations in the complex number system.

3. Linear Inequalities:

Linear inequalities. Algebraic solutions of linear inequalities in one variable and their representation on the number line. Graphical solution of linear inequalities in two variables. Solution of system of linear inequalities in two variables- graphically.

4. Permutations & Combinations:

Fundamental principle of counting. Factorial n. Permutations and combinations, derivation of formulae and their connections, simple applications.

5. Binomial Theorem:

History, statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, general and middle term in binomial expansion, simple applications.

6. Sequence and Series:

Sequence and Series. Arithmetic progression (A. P.), arithmetic mean (A.M.). Geometric progression (G.P.), general term of a G. P., sum of n terms of a G.P., geometric mean (G.M.), relation between A.M. and G.M. Sum to n terms of the special series: $\sum n, \sum n^2 \text{ and } \sum n^3$.

UNIT- III: COORDINATE GEOMETRY

1. Straight Lines:

Brief recall of 2D from earlier classes. Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axes, point-slope form, slope-intercept form, two -point form, intercepts form and normal form. General equation of a line. Distance of a point from a line.

2. Conic Sections:

Sections of a cone: circles, ellipse, parabola, hyperbola, a point, a straight line and pair of intersecting lines as a degenerated case of a conic section. Standard equations and simple properties of parabola, ellipse and hyperbola. Standard equation of a circle.

3. Introduction to Three -dimensional Geometry

Coordinate axes and coordinate planes in three dimensions. Coordinates of a point in space. Distance between two points and section formula.

UNIT-IV: CALCULUS

1. Limits and Derivatives:

Derivative introduced as rate of change both as that of distance function and geometrically, intuitive idea of derivatives. Definition of derivative, limits, limits of trigonometric functions.

UNIT-V: MATHEMATICAL REASONING

1. Mathematical Reasoning:

Mathematically acceptable statements. Connecting words/ phrases - consolidating the understanding of "if and only if (necessary and sufficient) condition", "implies", "and/ or", "implied by", "61nd", "or", "there exists" and their use through variety of examples related to real life and Mathematics. Validating the statements involving the connecting words-difference between contradiction, converse and contrapositive.

UNIT-VI: STATISTICS & PROBABILITY

1. Statistics:

Measure of dispersion; mean deviation, variance and standard deviation of ungrouped/grouped data. Analysis of frequency distributions with equal means but different variances.

2. Probability:

Random experiments: outcomes, sample spaces (set representation). Events: occurrence of events, 'not', 'and' & 'or' events, exhaustive events, mutually exclusive events. Axiomatic (set theoretic) probability, connections

with the theories of earlier classes. Probability of an event, probability of 'not', 'and' & 'or' events.

Compulsory for all
RELATIONS AND FUNCTIONS

1. Relations and Functions:

Types of relations: reflexive, symmetric, transitive and equivalence relations. One to one and onto functions, composite functions, inverse of a function. Binary operations.

2. Inverse Trigonometric Functions:

Definition, range, domain, principal value branches. Graphs of inverse trigonometric functions. Elementary properties of inverse trigonometric functions.

ALGEBRA

1. Matrices:

Concept, notation, order, equality, types of matrices, zero matrix, transpose of a matrix, symmetric and skew symmetric matrices. Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2). Concept of elementary row and column operations. Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries).

2. Determinants:

Determinant of a square matrix (upto 3×3 matrices), properties of determinants,

minors, cofactors and applications of determinants in finding the area of a

triangle. Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

CALCULUS

1. Continuity and Differentiability:

Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit function. Concept of exponential and logarithmic functions and their derivative. Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives. Rolle's and Lagrange's Mean Value Theorems (without proof) and their geometric interpretations.

2. Applications of Derivatives:

Applications of derivatives: rate of change, increasing/ decreasing functions, tangents & normals, approximation, maxima and minima (first derivative test motivated geometrically and second derivative test given as a provable tool). Simple problems (that illustrate basic principles and understanding of the subject as well as reallife situations).

3. Integrals:

Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, only simple integrals of the type

$$\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{\sqrt{a^2 - x^2}},$$

$$\int \frac{dx}{ax^2 + bx + c}, \int \frac{dx}{\sqrt{ax^2 + bx + c}}$$

$$\int \frac{(px+q)}{ax^2 + bx + c}dx, \int \frac{(px+q)}{\sqrt{ax^2 + bx + c}}dx,$$

$$\int \sqrt{a^2 \pm x^2}\,dx \text{ and } \int \sqrt{x^2 - a^2}\,dx$$

to be evaluated.

Definite integrals as a limit of a sum. Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals

4. Applications of the Integrals:

Applications in finding the area under simple curves, especially lines, arcs of circles/ parabolas/ellipses (in standard form only), area between the two above said curves (the region should be clearly identifiable).

5. Differential Equations:

Definition, order and degree, general and particular solutions of a differential equation. Formation of differential equation whose general solution is given. Solution of differential equations by method of separation of variables, homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type :

$$\frac{dy}{dx} + p(x)y = q(x)$$, where $p(x)$ and $q(x)$ are

functions of x.

LINEAR PROGRAMMING

1. Linear Programming:

Introduction, definition of related terminology such as constraints, objective function, optimization, different types of linear programming (L.P.) problems, mathematical formulation of L.P. problems, graphical method of solution for problems in two variables, feasible and infeasible regions, feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constrains).

PROBABILITY

1. Probability:

Multiplication theorem on probability. Conditional probability, independent events, total probability, Baye's theorem. Random variable and its probability distribution, mean and variance of haphazard variable. Repeated independent (Bernoulli) trials and Binomial distribution.

For Science stream students

1. Vectors:

Vectors and scalars, magnitude and direction of a vector. Direction cosines/

ratios of vectors. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Scalar (dot) product of vectors, projection of a vector on a line. Vector (cross) product of vectors.

2. Three - dimensional Geometry:

Direction cosines/ratios of a line joining two points. Cartesian and vector equation of a line, coplanar and skew lines, shortest distance between two lines. Cartesian and vector equation of a plane. Angle between (i) two lines, (ii) two planes, (iii) a line and a plane. Distance of a point from a plane.

For Non - Science stream students

1. Partnership

Basic definitions, sharing of profits, partner's salaries and interest on Capital, Profit sharing on Admission of a New Partner of Retirement of an existing partner.

2. Bill of Exchange

Bill of Exchange, True Discount, Banker's Discount and Banker's Gain.

3. Linear Programming

Linear Programming Problems, Different Areas of Applications of Linear Programming Problems, Basic Concepts of Linear Programming Problems, Mathematical Formulation of a Linear Programming Problem, Advantages of Linear Programming Problems, Limitations of Linear Programming, The Graphical Method of Solving and LPP, Some Exceptional Cases.

GENERAL KNOWLEDGE
SYLLABUS GUIDELINES

Look & say, who am I ,whose home, whom they belong, buildings, colors, words & stories, plant & animals, world and its people, festivals, wearing, place of worship, sightseeing, sports and fun, music, famous peoples, leaders, simple science, our earth, seasons, safety rules, India & world visit.

CLASS II

Look & say , who am I , Road signs, colors, shapes, manners, holy books, odd one out, animals & birds voice, land & water life, festivals, calendar, weather, temples, famous sightseeing, sports persons, dance , great personalities, general science, basic computer, India & world today.

CLASS III

Look & say, our environment, where will u see, foods, habitat, shapes, writers and books, plant & animals, means of transports, my country, temples, famous sightseeing, people, currency, sporting events and trophies, music and dance, leaders of India, Famous foreigners, solar system & space, body parts, basic computer, around the world.

CLASS IV

Signs & symbols, one word , comics & comics heroes, abbreviation, science & inventions , books & authors, animals & plants behaviours, India tour, capitals, State & religions, dress up, foods, festivals, dance & music, sporting events and trophies , famous Indian & world personalities.

CLASS V

Animals & plants, nature facts, books & authors, tales of India, music & instruments, space science, cinema & TV quiz, discoveries & inventories, everyday science, sports scan. Books & authors, art & culture, world geography.

CLASS VI

Indian literature, animals kingdom, dishes worldwide, odd one out, tourist places, earth & space, world geography, sports & winners, world personalities. Movies & awards, India's & worlds. Abbreviations.

CLASS VII TO X

General Knowledge

- Awards, Honours and Prizes
- Longest, Highest, Greatest, Deepest, First, Largest, Busiest, Heaviest, Tallest, Smallest, Most, Least in World and India.
- Important Cities, Places, Building of the world
- Countries/Cities-old and New Names
- Geographical surnames (Sobriquets-Nicknames)
- India's Major river valley projects (Irrigational/Multi purpose)
- Major Thermal power projects
- Important riverside cities of India
- Famous Places, Towns and Cultural heritage of India.
- Presidents of India
- Vice Presidents of India
- Prime Ministers of India
- Chief Justices of India
- Chief Election Commissioners of India
- Important organisations and founders
- Socio-religious reform movements in India (Hindu/ Muslim organisations)
- Leaders of Bhakti Movements
- Battles and wars in India
- Important foreign travellers/envoys and their travel accounts about India
- Indian Press
- First in India
- Musical Instruments and Artists
- Indian classical dances and related areas
- Geographical Discoveries
- Scientific Units
- Sports Terms
- Some important Cups & Trophies

- 7 Wonders of the world (Ancient/Modern)

Latest General Knowledge

- Sports Current Affairs
- Winners of Padma Vibhushan
- Winners of Padma Bhushan
- Winners of Padma Shri
- Commonwealth Games medals tally
- Commonwealth Games medal winners for India
- Award, Honours And Prizes
- Chief Justice of India(present)
- Chief Election Commission of India(present)

CLASS XI TO XII

- General Awareness
- General Knowledge at a Glance
- General Science (Astronomy, Biology, Physics, Chemistry, Computer Science, Engineering & Tech Science, Environmental Science, Human Body & Biomedical Science, Earth, Importance of measure to Science & Meteorology)
- Geography (Indian Geography & World Geography)
- Indian Economy
- History (Indian History & World History)
- Indian National Movement
- Indian Politics

ENGLISH

SYLLABUS GUIDELINES
Based on CBSE, ICSE & GCSE Syllabus & NCF guidelines devised by NCERT

CLASS I

Section I.

Comprehension: General topics (One word answers), Story based (One word answers should be of one word).

Section II.

Knowledge: Identification of things/objects of daily use, Identification of characters, Identification of Monuments/places, Answering general questions.

Section III.

Grammar: Alphabetical order, Use of small /capital letters, Correct spellings/ pronunciation of a word and knowledge of sounds, Noun (Elementary knowledge and recognition), Pronoun (Elementary knowledge and recognition), Verb (Elementary knowledge and recognition), Singular/plural, Formation of short and simple sentences, Opposite words, Synonyms.

CLASS II

Section I.

Comprehension

- General topics (One line answer)
- Story based (One line answer)

Section II.

Knowledge

- Identification of great personalities
- Identification of characters
- Answering general question.

Section III.

Grammar

- Sentence formation from Jumbled words
- Use of sounds
- Noun
- Pronoun
- Verbs
- Articles
- Singular/plural

CLASS III

Section I.

Comprehension l Based on General Topics l Story based topics.

Section II

Knowledge l Classification l Answering General questions l Understanding through definition and example.

Section III.

Grammar formation and use l Sentences l Noun l Pronoun l Verb l Articles l Preposition l Conjunction l Antonyms/ Synonyms l Use of possessives l Jumbled sentences. Section IV. Understanding developing writing skill l Story construction l Short paragraph construction

CLASS IV

Section I.

Comprehension :

- Based on General topics
- Story based topics.

Section II.

Knowledge :

- Classification
- Analogy
- Answer of General question.

Section III.

Grammar :

- Sentence
- Noun
- Pronoun
- Verb
- Article
- Preposition
- Conjunction
- Antonyms
- Synonyms
- Jumbled sentence
- Elementary knowledge of tenses through use of possessives.

Section IV.

Writing Skills :

- Story construction
- Short composition

CLASS V

Section I.

Comprehension l General topic l Story based.

Section II.

Knowledge l Classification l Analogy l Distinguishing between real and imaginary l Distinguishing between fact and opinion l Distinguishing through definition and example.

Section III.

Grammar l Sentences l Noun l Pronoun l Verb l Articles l Preposition l Conjunction l Voice l Direct and indirect speech l Antonym / Synonym l Elementary Idea of tenses l Jumbled sentences.

Section IV.

Writing Skills l Story Construction l Essay Construction.

CLASS VI

Section I.

Comprehension l Based on General topics l Story / Incident based l Stanza based.

Section II.

Knowledge l Classification l Analogy l Distinguishing between Fact and Opinion l Identification through definition and example l Antonyms /Synonyms l Jumbled sentence.

Section III.

Grammar l Noun l Pronoun l Verb l Adverb l Preposition l Conjunction l Tenses l Voice l Modals.

Section IV.

Analysis l Inferring information l Judging completeness of process l Judging logic of actions l Judging story logic.

Section V.

Writing Skills l Paragraph l Essay l Letters

CLASS VII

Section I.

Comprehension 1. Based on General topics 2. Story / Incident based 3. Stanza based.

Section II.

Knowledge l Classification l Analogy l Distinguishing between Fact and Opinion l Identification through definition and example l Antonyms /Synonyms l Jumbled sentence.

Section III.

Grammar l Noun l Pronoun l Verb l Adverb l Preposition l Conjunction l Tenses l Voice l Modals l Clauses l Determiners.

Section IV.

Analysis l Inferring information l Judging completeness of process l Judging logic of actions l Judging story logic.

Section V.

Writing Skills l Paragraph l Essay l Letters l Notice, Message, and Reports

CLASS VIII

Section I. Comprehension

- Based on General topics
- Story
- Incident based
- Stanza based.

Section II.Knowledge

- Classification
- Analogy
- Distinguishing between Fact and Opinion
- Identification through definition and example l Antonyms /Synonyms • Jumbled sentence.

Section III.Grammar (Uses and application of all topics mentioned below)

- Noun
- Pronoun
- Verb
- Adverb
- Preposition
- Conjunction
- Tenses
- Voice
- Modals
- Clauses
- Determiners.

Section IV. Analysis

- Inferring information
- Judging completeness of process
- Judging logic of actions
- Judging story logic.

Section V.

Writing Skills

- Paragraph
- Essay
- Letters
- Notice, Message, and Reports

CLASS IX

Section I. Comprehension

- General topics

- Story / Incident based
- Based on current affairs
- Stanza based.

Section II. Knowledge

- Classification
- Analogy
- Word-meanings
- Jumbled sentences
- Antonym/ synonym.

Section III. Grammar

(All Topics :— Recognition and Use).

Section IV. Analysis l

- Inferring information
- Judging completeness of process
- Judging logic of actions
- Judging story logic.

Section V. Writing Skills

- Notice, Message, Telegram and Reports
- Paragraph
- Letters

CLASS X

Section I. Comprehension

- General topics
- Story / Incident based
- Based on current affairs
- Stanza based.

Section II. Knowledge

- Classification
- Analogy
- Word-meanings
- Jumbled sentences
- Antonym/ synonym.

Section III.

Applied Grammar (All Topics).

Section IV. Analysis

- Inferring information
- Judging completeness of process
- Judging logic of actions
- Judging story logic.

Section V. Writing Skills

- Notice, Message, Telegram and Reports
- Paragraph
- Letters

CLASS XI TO XII

The paper will be essentially based on general english but may also contain reading an unseen passage and poem. Writing, Seminar,Text for detailed study, Drama, Fiction, Advanced, Reading Skills. Effective Writing Skills, Applied Grammar, Literature, Conversation Skills (Listening + Speaking)

CYBER

SYLLABUS GUIDELINES
Based on CBSE, ICSE & GCSE Syllabus & NCF guidelines revised by NCERT

CLASS I

What is Computer? Main parts of a Computer : Devices used with a Computer. How to Operate your Computer? What Computer can Do?

CLASS II

Computers Environment; Parts of a Computer; Application of Computers; Start & Shut down a Computer; Keyboard; Input/Output Device; MS-Paint;

Miscellaneous.

CLASS III

Generations of Computers; Hardware & Software; Explore Keyboard; Input & Output Devices; Data Storage; Familiarity with Windows; Paint Brush.

CLASS IV

Generations of Computers; Computer and its Peripherals; Computer Memories; Characteristics of Memory Devices; Software Classification; A brief about Computer Languages; Fundamentals of Windows; Hands on with Paint Brush; working with MS-Word.

CLASS V

Categories of Computers & Memory Device; Understanding Windows; Working with MS-Word; Applications of Multimedia; Understanding Internet.

CLASS VI

World of Computers; Input & Output Devices; Word Processing; Spreadsheet; Windows; Multimedia, Networking & Internet.

CLASS VII

A Walk Through Computers; Types of computer Languages; Computer Networking and its Usage; Windows Explorer; Microsoft Word; Understanding World of Internet; Microsoft Excel; Introduction of Power-point.

CLASS VIII

Technological Development of Computers; How Computer Works?; Computer Software Fundamentals; Coding with Logo; Managing Windows; Word processing with MS-Word; Surfing the NET

CLASS IX

Computer Devices & Programming Lanaguage; Operating Systems; Computer and Communication; MS-Word; MS-Excel; PowerPoint

CLASS IX

Computer Devices & Programming Lanaguage; Operating Systems; Computer and Communication; MS-Word; MS-Excel; PowerPoint

CLASS X

The World of Internet; World Wide Web; Internet Usage; HTML (Hyper Text Markup Lanaguage); MS-Access

CLASS XI

Computer Hardware; Windows Server & Website; C++; Algorithms; Oracle; Visual Basic.

CLASS XII

C++; Visual Basic; Networking; Multimedia & web Technology; RDBMS.

☺☺☺

NSSO Syllabus

Class 1 to Class 4

Questions will be based on General Science (related to Space)

Class 5 & Class 6

Unit 1   Our Solar System

Unit 2   The Sun

Unit 3   Planets

Unit 4   Earth

Unit 5   Galaxies

Unit 6   Our Universe

Unit 7   Asteroids

Unit 8   Comets

Unit 9   Eclipse

Unit 10   Solar Eclipse/Lunar Eclipse

Class 7 & Class 8

Unit 1   Our Solar System

Unit 2   The Sun

Unit 3   Inner Planets (Mercury, Venus, Mars & Earth)

Unit 4   Outer Planets (Jupiter, Saturn, Uranus & Neptune)

Unit 5   Smaller Bodies in Solar System.

Unit 6   Comets/Asteroids/Meteoroids

Unit 7   Galaxies

Unit 8   Milky Way Galaxy

Unit 9   Eclipse

Unit 10   Solar Eclipse/Lunar Eclipse

Class 9 & Class 10

Unit 1   History of Astronomy.

Unit 2   Overview of Solar System.

Unit 3   The Distribution and Orbits of Planets.

Unit 4   Physical Characteristics of Planets.

Unit 5   Earth's Motion

Unit 6   Earth and Moon

Unit 7   Terrestrial Planets

Unit 8   Jovian Planets

Unit 9   Smaller Bodies in Solar System.

Unit 10   Asteroids/Comets/Meteoroids

Unit 11   Galaxies

Unit 12   Stars

Unit 13   The Sun and its Structure.

Unit 14   Cosmology

Unit 15   External Galaxies

Unit 16   Hubble's Law

Class 11

Unit 1   Basic Astrophysics

Unit 2   Coordinate & Times

Unit 3   Solar System

Unit 4   Stars

Unit 5   Stellar System

Unit 6   Cosmology

Unit 7   Instrumentation & Space Technologies, with emphasis on Physics & Maths.

Syllabus Guidelines for Class 9th & 10th (Financial Literacy [FL])

1. Money

- History of money
- Barter system
- Importance and concept of money
- Coins
- Paper money
- Plastic money
- E-Money

2. General and Household Economics

- Earnings
- Nature of Earnings
- Needs and wants
- List your expenses
- Find Simple ways to save money
- Expenditure, Cost and Prices, Inflation
- Savings & Thrift, What you save is what you earn
- Borrowing-Mild Definition
- Investment-Mild Definition
- Interest-Mild Definition
- Interest Rate-Mild Definition

3. Stock Exchange especially B.S.E.

Syllabus Guidelines for Class 11th & 12th (Financial Literacy [FL])

1. Banking

- Definition
- Role of Bank – in growth of saving and Investment
- Types of banks
- Services offered by banks
- Deposits and Loans
- Types of A/c
- Opening a bank A/c
- How to Transact with banks
- KYC norms – (A/c opening form, Address Proof)
- How to read bank statement
- Banking products and services
- Calculating Interests – Saving, FD, Simple and Compound Interest
- Power of compounding
- Loans
- Types of loans
- Definition of EMI
- Calculation of EMI
- Difference between Banks and Money Lenders
- Micro Finance
- How to make a complaint – Banking complaints
- Ombudsman
- Basic of foreign Exchange
- Importance and Use of Foreign Exchange
- Check Counterfeit Currency
- CIBIL
- Regulator – Role of RBI

2. Investment

- Piggy Bank
- Principles of Investment – Safety, Liquidity and Return
- Bank Saving
- FD, RD, Post office Savings
- POMIS,NSC
- PPF
- NPS
- Bonds and Debentures
- Shares
- Mutual funds
- Gold and Silver
- Real Estate
- Arts and other investments
- Commodities
- Asset allocation
- Risk and Return
- Basics of Investment – liquidity, credit
- Compounding and Time value of money
- Nominal and Real Return (Inflation)
- Effect of taxes
- Long term v/s Short term

3. Behaviour Aspects

- Concept of Needs and Wants
- Helping the needy

- Spend wisely v/s waste spending
- Conscious Consumption – lavish
- Impulsive spending
- Whatever you save is what you earn
- Using money responsibly
- Avoiding cash payments
- Insisting on Bills
- Dangers of excessive borrowing
- Repayment of loans
- Make informed choices
- Ownership of your financial decision
- Take care of your old ones
- Tax Payment
- Insider Trading
- Up Keep your Financial records
- Free advise may be injurious

4. Insurance

- Meaning
- Need and Wants
- Loss protection
- Life, non-life and health
- Benefits of Insurance
- Term plans
- Investment plans
- Hybrid plans-Ulip etc.
- Agents, advisors
- Role of Insurance companies
- Regulator -IRDA
- Ombudsman
- How to take a new policy
- How to revive an old policy
- Transaction cycle
- Nomination
- Assignment
- Claims settlement

- Exclusions
- Differences between Insurance and Investment

5. Financial Planning

- Meaning
- Household financial health check up
- Important life stages
- Education
- Medical and other Emergencies
- Social obligations
- Goal setting
- Budgeting
- Marriage
- Buying a house
- Plan a vacation
- Retirement planning
- Price of procrastination

6. Retirement and Estate planning

- Concept
- PPF, EPF, Gratuity, NPS, SCSS
- Finacial need after retirement
- Three Stages –Saving, Accumulating and Dis-saving
- Calculating of corpus required after retirement
- Protection from Inflation
- Reverse Mortage
- Definition of will
- Making a will

7. Grievance and Redressal

- Financial Advisor, CA, CFP, CPFA
- Basic terms and processes in Securities Market
- Market rumors and tips
- Sources of reliable information

- What are Indices (SENSEX and NIFTY)
- Investment v/s speculation

8. Use of Technology Do and Don'ts
- Password protection
- NEFT and RGTS
- ATM
- Online trading
- Internet banking
- Need for keeping mobile number with banks
- Three in one account
- Need of protecting your online account
- Functioning of stock exchanges
- Depository working mechanism
- Algorithmic trading

9. Scams, Frauds Schemes
- Free tips
- Insider trading
- Money laundering
- Phishing mail about winning a lottery
- Price rigging
- Real Estate frauds
- Banking and Credit card scams
- Preventive measures from getting duped

10. Borrowings-Need for borrowing
- Need for borrowing Source of borrowing
- Merit and demerits of borrowing
- How much to borrow
- Avoid life of credit
- Comparing interest rate on loan offering
- Importance of timely payment
- Credit cards – Merits and Demerits

11. Consumer protection and redressal mechanism
- Rights of Consumers
- Applicable to financial services
- Filing a complaint
- Complain to entity concerned
- Regulators
- Arbitration
- Consumer courts
- Govt. Websites-(PG Portals)
- Investor Associations

12. Taxes
- Meaning
- Need of Taxes
- Types of taxes
- How taxes impact income
- Income, wealth and gift tax
- Service tax, STT, Stamp Duty
- Tax planning v/s tax evasion
- Tax rates
- Tax free bonds
- Tax saving investment

13. Importance of maintaining financial records
- PAN and its utility
- Aadhar card
- Demat Account
- Bank statements and passbooks
- Insurance policies
- Tax return
- Property documents
- Helpline numbers of services

14. Stock Exchanges especially B.S.E.