

**TRIPURA BOARD OF SECONDARY  
EDUCATION**

**SYLLABUS  
(Effective from 2017)**

**SUBJECT : SCIENCE  
(Class-X)**

# SCIENCE

## COURSE STRUCTURE ( SYLLABUS )

### CLASS X

#### THEORY

**One Paper Time : 3 Hours**

**Total Marks : 80**

**Group - A [ Physics & Chemistry] and Group - B [ Biology]**

Subject	Unit	Title	Marks	
<b>Physics</b>	I	Electricity	07	
	II	Magnetic effects of Current	05	
	III	Light – Reflection and Refraction	08	
	IV	Human Eye and Colourful World	04	
	V	Sources of Energy	03	
			-	<b>27</b>
<b>Chemistry</b>	VI	Chemical reactions	04	
	VII	Acids, Bases and Salts	04	
	VIII	Metals and Non-metals	06	
	IX	Carbon compounds	06	
	X	Periodic classification of elements	03	
	XI	Conservation of natural resources	03	
			-	<b>26</b>
<b>Biology</b>	I	Life Processes	6	
	II	Control and Co-ordination in animals and Plants	6	
	III	Reproduction	5	
	IV	Heredity and Evolution	7	
	V	Our Environment	3	
				<b>27</b>
		<b>Grand Total</b>	-	<b>80</b>

**Note :**

- a) At least 60-65% of the Syllabuses of **Physics, Chemistry** and **Biology** should separately be completed before Pre-Test Examination.
- b) Two Answer scripts – one for **(i) Group-A (Physics & Chemistry)** and the other for **(ii) Group-B (Biology)** should be used during Examinations.

**Syllabus for Group - A****Physics****Unit I : Electricity ( 18 Periods ) ( 07 Marks )**

Electric current, potential difference and electric current. Ohm's law; Resistance, Resistivity, Factors on which the resistance of a conductor depends. Series combination of resistors, parallel combination of resistors and its applications in daily life. Heating effect of electric current and its applications in daily life. Electric power, Interrelation between P, V, I and R.

**Unit II : Magnetic effects of Current ( 14 Periods ) ( 05 Marks )**

Magnetic field, field lines, field due to a current carrying conductor, field due to current carrying coil or solenoid; Force on current carrying conductor, Fleming's Left Hand Rule. Electromagnetic induction. Induced potential difference, Induced current. Fleming's Right Hand Rule, Direct current. Alternating current: frequency of AC. Advantage of AC over DC. Domestic electric circuits.

**Unit III :Light - Reflection and Refraction (14 Periods) (08 Marks)**

Reflection of light by curved surfaces; Images formed by spherical mirrors, centre of curvature, principal axis, principal focus, focal length, mirror formula (Derivation not required), magnification. Refraction; Laws of refraction, refractive index. Refraction of light by spherical lens; Image formed by spherical lenses; Lens formula (Derivation not required); Magnification. Power of a lens; applications of spherical mirrors and lenses.

**Unit IV : Human Eye and Colourful World (09 Periods) (04 Marks)**

Functioning of a lens in human eye, defects of vision and their corrections; Refraction of light through a prism, dispersion of light, scattering of light, applications in daily life.

**Unit V : Sources of Energy ( 08 Periods ) ( 03 Marks )**

Different forms of energy, conventional and non-conventional sources of energy: Fossil fuels, solar energy; biogas; wind, water and tidal energy; Nuclear energy. Renewable versus non-renewable sources of Energy.

**Chemistry****Unit VI : Chemical reactions ( 8 Periods ) ( 04 Marks )**

Chemical Equation, Balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction.

**Unit VII : Acids, Bases and Salts (10 Periods) ( 04 Marks )**

Their definitions in terms of furnishing of  $H^+$  and  $OH^-$  ions, General properties, examples and uses, concept of pH scale (Definition relating to logarithm not required), importance of pH in everyday life; preparation and uses of sodium hydroxide, Bleaching powder, Baking soda, washing soda and Plaster of Paris.

**Unit VIII : Metals and Non-metals (12 Periods) ( 06 Marks )**

Properties of metals and non-metals, reactivity series, formation and properties of ionic compounds, basic metallurgical processes, corrosion and its prevention.

**Unit IX : Carbon compounds (15 periods) ( 06 Marks )**

Covalent bonding in carbon compounds. Versatile nature of carbon. Homologous series. Nomenclature of carbon compounds containing functional groups (halogens, alcohol, ketones, aldehydes, alkanes and alkynes), difference between saturated hydrocarbons and unsaturated hydrocarbons. Chemical properties of carbon compounds (combustion, oxidation, addition and substitution reaction). Ethanol and Ethanoic acid (only properties and uses), soaps and detergents.

**Unit X : Periodic classification of elements (10 periods) ( 03 Marks )**

Need for classification, Modern Periodic table, Gradation in Properties, Valency, Atomic number, metallic and non-metallic properties.

**Unit XI : Conservation of natural resources ( 8 Periods ) ( 03 Marks )**

Management of natural resources. Conservation and judicious use of natural resources. Forest and wild life, coal and petroleum conservation. Examples of People's participation for conservation of natural resources.

The Regional environment: Big dams: advantages and limitations; alternatives if any.

Water harvesting. Sustainability of natural resources.

**Syllabus for Group - B**

**Biology**

**Unit I : Life Processes (10 Periods) ( 6 Marks )**

‘Living being’, Basic concept of Nutrition, Respiration, Transport and excretion in plants and animals.

**Unit II : Control and Co-ordination in animals and Plants (10 Periods) (6 marks)**

Tropic movements in plants- Phototropism, Geotropism, Hydrotropism, Chemotropism; Immediate response to stimulus; Introduction to plant hormones- Auxin, Gibberellin, Cytokinin, Abscisic acid (ABA)-their sources and function in relation to growth and movement ;Control and co-ordination in animals: Nervous system; Voluntary, involuntary and reflex action; Chemical coordination- Animal hormones.

**Unit III : Reproduction (15 periods) ( 5 marks )**

Reproduction in animals and Plants (asexual and sexual); Reproductive health- Need and methods of family planning; Safe sex vs. HIV/AIDS; Child bearing and women’s health.

**Unit IV : Heredity and Evolution (15 periods) ( 7 marks )**

Heredity; Mendel’s contribution: Laws of inheritance of traits; Sex determination: Brief introduction; Basic concepts of Evolution.

**Unit V : Our Environment (4 periods) ( 3 marks )**

Ecosystem, Environmental problems, Ozone depletion, waste generation and their solutions, biodegradable and non-biodegradable substances.

## QUESTION TYPES WITH DISTRIBUTION OF MARKS (FINAL EXAMINATION)

Subject	Unit	MCQ/Objective (1 mark)	SA (2marks)	LA-I (3 marks)	LA-II (5 marks)	Total Marks
<b>Physics</b>	I to V	3	5	3	1	27
<b>Chemistry</b>	VI to XI	4	4	3	1	26
<b>Biology</b>	I to V	3	5	3	1	27
Total Marks	-	-	-	-	-	<b>80</b>
Number of Questions	-	10	14	9	3	-

### **N.B.**

1. Internal choice : There is no overall choice in the question paper. However, there is an internal choice in one question of 2 marks weightage, one question of 3 marks weightage and all the questions of 5 marks weightage.

2. In LA-I and LA-II type questions, allotted marks in each may be sub-divided into parts, if necessary.

3. Questions should be set covering all the units.

4. Word limitations:

- i) Questions of 1 (one) mark : within 1 word or 1 line
- ii) Questions of 2 (two) marks : within 20 words
- iii) Questions with 3 (three) marks : within 50 words
- iv) Questions with 5 (five) marks : within 100 words.

5. 'Question Types and Marks Distribution' of the Final Examination should also be followed in the Pre-Test and Test Examinations.

## PRACTICAL

### **Group-A (Physics & Chemistry) and Group-B (Biology)**

Every student will perform at least **9 Experiments (3 experiments from Physics, 3 experiments from Chemistry and 3 experiments from Biology)**.

#### **Evaluation Scheme for Practical Examination :**

- |  |            |
|--|------------|
| i) Three <b>Experiments</b> (one from Physics,<br>one from Chemistry and one from Biology )... (4+4+4 Marks).. | : 12 Marks |
| ii) Composite <b>Practical Record Book</b> (for 9 experiments..... )   | : 05 Marks |
| iii) <b>Viva on Experiments</b> .....  | : 03 Marks |
| <b>Total : 20 Marks</b>  |            |

**Practicals should be conducted alongside the concepts taught in Theory classes.**

### **Group-A ( Physics & Chemistry )**

#### **PHYSICS**

#### **List of Experiments :**

1. To study the dependence of potential difference (V) across a resistor on the current (I) passing through it and determine its resistance. Also to plot a graph between V and I.
2. To determine the equivalent resistance of two resistors when connected in series.
3. To determine the equivalent resistance of two resistors when connected in parallel.
4. To determine the focal length of: i) Concave mirror ii) Convex lens by obtaining the image of a distant object.
5. To trace the path of a ray of light passing through a rectangular glass slab for different angles of incidence. To measure the angle of incidence, angle of refraction, angle of emergence and to interpret the result.
6. To trace the path of the rays of light through a glass prism.
7. To find the image distance for varying object distances in case of a convex lens and draw corresponding ray diagrams to show the nature of image formed.

**CHEMISTRY****List of Experiments :**

1. To find the pH of the following samples by using pH paper/universal indicator.
  - a. Dilute Hydrochloric acid
  - b. Dilute NaOH solution
  - c. Dilute ethanoic acid solution
  - d. Lemon juice
  - e. Water
  - f. Dilute sodium bicarbonate solution.
2. To study the properties of acids and bases HCl and NaOH by their reaction with
  - a. Litmus solution (Blue/Red)
  - b. Zinc metal
  - c. Solid sodium carbonate.
3. To perform and observe the following reactions and classify them into:
  - i. Combination reaction
  - ii. Decomposition reaction
  - iii. Displacement reaction
  - iv. Double displacement reaction :
    - 1) Action of water on quick lime.
    - 2) Action of heat on ferrous sulphate crystals
    - 3) Iron nails kept in copper sulphate solution
    - 4) Reaction between sodium sulphate and barium chloride solutions.
4. a) To observe the action of Zn, Fe, Cu and Al metals on the following salt solutions.
  - i.  $\text{ZnSO}_4$  (aq)
  - ii.  $\text{FeSO}_4$  (aq)
  - iii.  $\text{CuSO}_4$  (aq)
  - iv.  $\text{Al}_2(\text{SO}_4)_3$  (aq)
 b) Arrange Zn, Fe, Cu and Al metals in the decreasing order of reactivity based on the above result.
5. To study the following properties of acetic acid (ethanoic acid) :
  - i) odour
  - ii) solubility in water
  - iii) effect on litmus
  - iv) reaction with sodium bicarbonate
6. To study saponification reaction for preparation of soap.
7. To study the comparative cleaning capacity of a sample of soap in soft and hard water.

**Group-B****BIOLOGY : List of Experiments :**

1. To prepare a temporary mount of a leaf peel to show stomata.
  2. To show experimentally that light is necessary for photosynthesis.
  3. To show experimentally that carbon dioxide is given out during respiration.
  4. To study (a) binary fission in Amoeba, and (b) budding in yeast with the help of prepared slides.
  5. To study homology and analogy with the help of models/charts of animals and models/charts/ specimens of plants.
  6. To identify the different parts of an embryo of a dicot seed (Pea, gram or red kidney bean).
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