

UTTAR PRADESH HINTS & SOLUTIONS _ CBSE Xth Board Examination-2018-19

SCIENCE(HINTS & SOLUTONS)

SUBJECT CODE : 824(BJ)

Time allowed : 3 Hrs 15 minute

Maximum Marks : 70

Note : First 15 minute are allotted for the candidates to read the question paper.

General Instructions : (i) This question paper is divided into three parts, A, B and C. (ii) First question of each part is multiple choice type. Four alternative answers are given in each. Select the correct answer and write down in your answer-book. (iii) Attempt all the guestions of each part together at one place. Each part should be attemped on new page. (iv) All questions are compulsory. (v) Marks of the questions are mentioned against them. (vi) Illustrate your answers with neat and labeled diagrams and chemical equations wherever necessary. PART-A 1 If a bulb of rating 200 V / 100 W is used at 100 volt then what will be the power of the bulb ? (a) (ii*) 25 W (i) 50 W (iv) 40 W (iii) 100 W What will be the position and nature of the image of an object formed by a convex mirror placed (b) between infinity and pole (P) of the mirror ? (i*) In between P and F behind mirror, virtual and erect (ii) In between P and F behind mirror, virtual and inverted (iii) In front of mirror, real and erect (iv) In front of mirror, virtual and erect. (Here F is focus.) Speed of light in vacuum is 3 x 10⁸ m/sec. Then speed of light in glass (refractive index 1.5) will be (C) (i) 4-5 x 10⁸ m/sec (ii) 2.0×10^6 m/sec (iii) 3.0 x 10⁶ m/sec (iv*) 2.0 x 10⁸ m/sec Equivalent resistance between point's A and B of the following circuit is (d) 10 • B 0-5 D 10 (i) 2.5 Ω (iii*) 1.0 Ω (iv) 2.0 Ω (ii) 1.5 Ω 1

2.

(a) Define far-sightedness. Which type of lens will you use to remove it ?

Sol. A person with Far Sightedness can see distant objects clearly but can not see near by objects distinctly. A hypermetropic person has the near point farther away from minimum distance of distinct vision (i.e. 25 cm). In a hypermetropic eye, the image of a nearby object is formed behind the retina. Convex lens is used to correct this defect by conversing the rays on the retina.

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- (b) Why is colour of clear sky blue ?
- Sol. Due to scattering of light.
- (c) Internal resistance of a cell of 1.5 volt is 0.5 Ω . What is the maximum current that can be obtained by this cell ?

Sol.
$$\therefore I = \frac{V}{R_{eq}}$$

 $I = \frac{V}{R_i + R_{ext}}$
For maximum $R_{ext} = 0$
 $I_{max} = \frac{V}{R_i} = \frac{1.5}{0.5} = 3A$

3. (a)

Which type of mirror you will use to view the vehicle approaching your car or bike from the rear side ? Answer with reasons. Whether the image formed will be real or virtual ?

OR

A 5.0 cm long object is placed at a distance of 20 cm from a convex lens of focal length 10 cm. Object is placed normal to the principal axis of the lens. Find out nature, position and size of the image.

Sol. Convex mirror is used as rear view mirror in automobiles like cars, trucks and buses to see the traffic at the back side because has large field of view. (image will be smaller, virtual and erect. More image can fit in the mirror).

OR

By lens formula

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\Rightarrow \frac{1}{10} = \frac{1}{v} - \left(-\frac{1}{20}\right) \qquad \Rightarrow \frac{1}{v} = \frac{1}{10} - \frac{1}{20}$$

$$\frac{1}{v} = \frac{2 - 1}{20} \Rightarrow v = 20 \text{ cm}$$
Now, $m = \frac{v}{u} = \frac{20}{-20} = -1$ (inverted and of same size)
 $m = \frac{h_i}{h_o} \Rightarrow -1 = \frac{h_i}{5 \text{ cm}} \Rightarrow h_i = -5 \text{ cm}$

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(b) What is Ohm's law? How is it verified with the help of an electrical circuit?

OR

What do you meant by the power of a lens ? If power of a lens is -2D, then what will be the focal length and nature of the lens ?

Sol. Ohm's law: It states that the current passing through a conductor is directly proportional to the potential difference across its ends, provided the temperature and other physical conditions (mechanical strain etc.), remain unchanged

i.e., $I \propto V$ or $V \propto I$ or $V = RI \implies R = V/I$ Where R is a constant called resistance of the conductor.

Experimental verification of Ohm's law : By changing the resistance through Rheostat , note down the value of ammeter and voltmeter and plot the graph. Its shows straight line i.e., $V \propto I$



Power of lens is the measure of deviation produce by a lens. It is defined as the reciprocal of its focal length in metres. Its unit is Diopter (D) (f should always be in metres).

Power (P) =
$$\frac{1}{\text{focal length}(f \text{ in m})}$$

 $\therefore P = \frac{1}{f(m)} \Rightarrow f = \frac{1}{(-2D)} \Rightarrow f = -0.5 \text{ n}$

As sign of focal length is negative it is a concave lens.

4. Show the connection of a fan, 3 bulbs and a water pump with the electric meter of your house. Use fuse at appropriate place. What is the benefit of using MCB (Micro Circuit Breaker) instead of fuse ?

OR

Write down the laws of electromagnetic induction. Explain the working of a dynamo based on this principle by using appropriate diagram.

Sol.





These days a device called a miniature circuit breaker (MCB) is also used instead of or in addition of fuses, in the household electric circuits. It is a switch that automatically switches off a circuit if the current in it exceeds the specified maximum limit.

MCB are more sensitive to current than fuses. Also there is no need of replacement in MCB unlike fuse.

OR

Laws of Electromagnetic induction : There are two laws of electromagnetic induction. (i) Whenever there is a change in magnetic flux linked with a conductor, an emf is induced. (ii) The magnitude of the emf is directly proportional to the rate of change of magnetic flux linked by the conductor.



5.

6. (b) Write a method of preparation and one use of Plaster of Paris by giving necessary chemical equation.

(c) By explaining malleability and ductility, write that these are the properties of which type of elements.

Sol. (a) Cleansing action of soap : Mostly the dirt is held to any surface by the oil which is present there. Now since the oil are not soluble in water, the dirt particles cannot be removed by simply washing the cloth with water. However, when soap is applied, the non polar hydrocarbon part of the soap molecules dissolves in oil droplets while the polar - COO- Na* groups remain attached to water molecules. In this way, each oil droplet gets surrounded by negative charge. In a soap solution, the hydrocarbon portions of several soap molecules huddle together to form aggregates of molecules (or ions) called micelles

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These negatively charged oil droplets cannot coalesce and continue breaking into small droplets .These oil droplets (containing dirt particles) can be washed away with water along with dirt particles. So, the action of soap or detergents is to emulsify oil or grease, this loosens the solid particles of dirt and they are removed.

(b) It is prepared by heating gypsum (CaSO₄.2H₂O) at about 373 K in large steel pots with mechanical stirrer,

$$CaSO_4.2H_2O \longrightarrow CaSO_4.\frac{1}{2}H_2O + \frac{3}{2}H_2O$$

The temperature is carefully controlled, as at higher temperature gypsum is fully dehydrated.

When finely powdered Plaster of Paris is mixed with water and made into a paste, it quickly sets into a hard mass.

(i) It is used for making toys, cosmetics and casts of statues

(ii) It is used as a cast for setting broken bones.

(c) malleability : Property of elements to convert into very thin sheets without breaking.

ductility: Property of elements to be drawn (stretched) into thin wires.

Both the properties are shown by Metals

e.g. Au, Ag, Cu, Al

7.

(a) Describe the extraction of metal from the sulphide ore of zinc by giving chemical equation. (b) Explain rusting by citing an example and write safety measures from rusting. Sol.

(a) Describe the extraction of metal from the sulphide ore of zinc by giving chemical equation.

- Extraction of metal from the sulphide ore of zinc (Zinc blende ZnS) is done by following method (i) Froth floatation process
 - (ii) Roasting:
 - (iii) Reduction with carbon
 - Purification by distillation (iv)

(i) Froth floatation process : This method is based on the principle of difference in the wetting properties of the ore and gangue particles with oil and water respectively.



(ii) Roasting: It is the process of heating the concentrated ore strongly in the presence of excess air. This process is used for converting sulphide ores to metal oxide. the following changes take place :

the ore undergo oxidation to their oxides.

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moisture is remvolatile impuriti	noved. es are removed.			
2ZnS(s) + 30 ₂	(g) $\xrightarrow{\text{Roasting}}$	2ZnO(s)	+ 2SO ₂ (g)	
Zinc Oxy sulphide (from (Zinc blende)	gen air)	Zinc oxide	Sulphur dioxide	
(iii) Reduction w	ith carbon :			
ZnO(s) + C(s) Zinc Carbon	→ Zn(s) Zinc	+ CO(g) Carbon		

monoxide

(iv) Distillation :

oxide (Reducing agent) metal

In this method Impure metal is heated and its vapours are separately condensed in a receiver. The non-volatile impurities are left behind.

(b) Explain rusting by citing an example and write safety measures from rusting. Iron corrodes readily when exposed to moisture and gets covered with a brown flaky substance called rust. This is also called Rusting of Iron. Chemically, the rust is hydrated iron (III) oxide, Fe₂O₄.xH₂O.

$$2Fe(s) + 3/2O_2(g) + xH_2O(I) \rightarrow Fe_2O_3.xH_2O(s)$$

hydrated ferric oxide
(Rust)

Safety measures from rusting. Rusting can be prevented if iron objects are not allowed to come in contact with the damp air. Some common methods generally used are given below.

(i) By painting the iron articles such as window grills, iron gates, steel furniture, railway coaches, bodies of cars, buses etc.

(ii) By greasing and oiling the iron articles such as mechanical tools, machine parts etc.

(iii) By galvanisation, i.e. coating the surface of iron objects with a thin layer of zinc.

8. What is glacial acetic acid? Write chemical equation of four reactions of acetic acid.

OR

Write equations of four chemical reactions of ethyl alcohol and also write its three uses.

Sol. The melting point of ethanoic acid is 290 K and hence it often freezes during winter in cold climates. Therefore, it is named as **glacial acetic acid.**

(i) It reacts with a solution of sodium hydroxide to form sodium ethanoate and water.

$$CH_3COOH+ NaOH \implies CH_3COONa + H_2C$$

(ii) It reacts with sodium carbonate with the evolution of CO₂ gas.

 $2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + H_2O + CO_2 \uparrow$

(iii) When ethanoic acid is heated with ethanol in presence of small quantity of conc. H_2SO_4 ethyl ethanoate, a sweet smelling ester, is formed. This process of ester formation is called esterification.

$$CH_3COOH + C_2H_5OH \xrightarrow{H+} CH_3COOC_2H_5 + H_2O$$

Ethyl ethanoate

(iv) It reacts with metals like sodium, zinc and magnesium to liberate hydrogen gas.

 $2CH_3COOH + 2Na \rightarrow 2CH_3COONa + H_2 \uparrow$

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OR

(i) Combustion : Ethanol burns in air with a blue flame to form CO₂ & H₂O.

 $C_2H_5OH + 3O_2 \longrightarrow 2CO_2 + 3H_2O + heat \& light$

(ii) Reaction with sodium : Ethanol reacts with sodium to produce hydrogen gas and sodium ethoxide.

> $2C_2H_5OH + 2Na \longrightarrow 2C_2H_5ONa + H_2(\uparrow)$ Sodium ethoxide Ethanol

(iii) Reaction with carboxylic acids

When ethanol reacts with ethanoic acid in presence of concentrated sulphuric acid, ethyl ethanoate and water are formed.

> $CH_3COOH + C_2H_5OH \xrightarrow{Conc. H_2SO_4} CH_3COOC_2H_5 + H_2O$ Ethanoic Ethanol Ethyl ethanoate acid

(iv) •

Action with concentrated sulphuric acid :

$$\begin{array}{c} CH_{3}CH_{2}OH \xrightarrow{Conc. H_{2}SO_{4}} & CH_{2} = CH_{2} + H_{2}O \\ \hline 443K & Ethene \end{array}$$

The concentrated sulphuric acid may be regarded as a dehydrating agent because it removes water from ethanol.

Uses of Ethanol :

- Ethanol is a constituent of beverages like beer, wine, whisky and other liquors.
- Ethanol is used to sterilize wounds and syringes.
- It is used in manufacture of paints, dyes, medicines, soaps and synthetic rubber. Solution of ethanol prepared in pharmaceutical industry are known as tinctures.

			PARI-C		
9.	a)	Soluble only in water is			
		i) Vitamin A	ii) Vitamin D	iii) Vitamin K	iv) Vitamin C
Sol.	iv) Vitan	nin C			
	b)	ATP and NADP.2H are	produced in		
		i) Mitochondria	ii) Chloroplast	iii) Peroxisomes	iv) Lysosomes.
Sol.	i) Mitoch	nondria			
	C)	Budding is found in			
		i) Planaria	ii) Hydra	iii) Leishmania	iv) All of these
Sol.	ii) Hydra	1 A			
	d)	Made up of only nucleic	acid and proteins are		
		i) Bacteria	ii) Chloroplast	iii) Viruses	iv) Prions
Sol.	iii) Virus	es			

10. Mention any four differences between respiration and combustion. а.

Sol.

S.NO.	RESPIRATION	COMBUSTION
1.	It is a biochemical process.	It is a chemical process.
2.	It takes place at normal	It takes place at high temperature.
	temperature.	
3.	Respiration is a slow process completed in several steps.Thus, the energy is also liberated in several steps and remain stored in the form of ATP.	Combustion is fast process in which the energy is liberated only in one step resulting in increase in temperature and production of fire.
4.	A series of respiratory enzymes are	No enzymes are involved.
	invoivea.	

 $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$

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11. a. What are th permanent methods of family planning ? Write short notes on any two.

2+ 2

Sol. Surgical Methods: Surgical methods of birth control are available for males as well as females. In males, a small portion of the sperm duct (or vas deferens) is removed by surgical operation and both the cut ends are ligated (or tied) properly. This prevents the sperms from coming out. The surgical procedure carried out in males is called 'vasectomy'. In females, a small portion of the oviducts is removed by surgical operation and the cut ends are ligated (or tied). This prevents the ovum (or egg) from entering into the oviducts. The surgical procedure carried out in females is called tubectomy.

OR

What are ductless glands ? Explain the structure and functions of thyroid gland.

1 + 3

Sol. Ductless glands are also called as endocrine glands & they release their secretions directly into the blood.

Thyroid Gland :

The thyroid gland consists of two lobes joined together by an isthmus.

- It is situated in the lower part of the neck and when enlarged it forms goitre. Two hormones secreted by the thyroid gland are :
- (i) **Thyroxine:** It is the principal hormone secreted by the thyroid gland.
- Its main role is to increase the metabolic rate of the organs and tissues of the whole body.
- The basal metabolic rate (B.M.R.) is increased in hyperthyroidism and reduced in hypothyroidism.
- Hypothyroidism : Myxoedema is the condition caused by thyroid hormone deficiency in adults.
- Cretinism affects children and is due to congenital defect of either absence or defect of the gland.
- Iodine deficiency causes simple goitre.

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- Hyperthyroidism : Excessive amount of thyroxine is poured into the blood this condition being known as toxic goitre or exophthalamic goitre (grave's disease).
- (ii) Calcitonin: This hormone lowers the blood calcium level in two ways :
- By inhibiting renal tubular calcium reabsorption.
- By inhibiting bone calcium reabsorption.
- b. What are Mendel's laws ? Explain them with suitable diagrams. 1+1+2

Sol. Mendel's Laws of Inheritance :

- (i) The Principle of Paired Factors : Each character in an individual is governed by two factors called as gene. The alternative form of gene is called as alleles or allelomorphs. If an individual consists of similar types of alleles, they are called as homozygous e.g. TT, tt while those having different types of alleles are called as heterozygous e.g. Tt etc.
- (ii) The Principle of Dominance or Law of Dominance : When two homozygous individuals with one or more sets of contrasting characters are crossed the characters that appear in the F₁ hybrids are dominant characters and those which do not appear in F₁ are recessive characters.
- (iii) The Principle of Segregation or Law of Segregation : [Law of purity of gametes] The law of segregation states that when a pair of contrasting factors or genes or alleles are brought together in a heterozygous condition, the two remains together without being contaminated but when gametes are formed from them the two separate out from each other. This is also known as Mendel's first law of heredity.
- (iv) The Principle of Independent Assortment or Law of Independent Assortment : If the inheritance of more than one pair of characters is studied simultaneously, the factors or genes for each pair of characters assort out independently. It is called as Mendel's second law of heredity.

OR

What is reflex action ? Explain with examples.

Sol.

- Reflex action is the name given to the response which is at the level of spinal cord itself.
 - It is a rapid automatic response to a stimulus by an organ or a system of organs, which does not involve the brain for its initiation.
 - A reflex action is an unconscious (without will) and involuntary response of effectors (muscles or glands) to a stimulus. The pathway taken by nerve impulses in a reflex action is called the reflex arc.



Diagram to show the reflex action and its path (which is called reflex arc).

Examples of reflex actions :

- (i) Withdrawal of hand when pricked with a needle.
- (ii) Closing of eyes when flashed with strong light.

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OR

Describe briefly various theories related with evolution.

Sol. Theory of Special Creation :

According to this theory life was created by some Super Natural Power (God). This theory has no evidence, hence it is a rejected theory.

Theory of Spontaneous Generation : According to this theory life is originated repeatedly from nonliving materials, automatically from time to time. This theory was supported by Thales and Aristotle.

Theory of Biogenesis : Scientist like Redi, Lazzaro Spallanzani, Louis Pasteur proposed and proved the biogenesis concept of Huxley and Harvey that new organism arises from pre-existing ones.

Cosmozoic Theory : It states that, life came to earth from some heavenly bodies in the form of spores and seeds.

Modern Theories (Naturalistic Theories) : Life originated upon earth by a long series of physiochemical changes which brought about a gradual evolution of first inorganic and then organic compounds (chemical evolution). It results in the formation of protoplasm.

This includes –

- (i) Oparin Haldane Theory : Given by A.I. Oparin (Russia) and Haldane (England) Book Origin of life
- According to oparin and Haldane" Life originated abiogenetically first but biogenetically ever since."
- "Chemical evolution through physio-chemical process" was the main theme and also called Materialstic theory of oparin + Haldane.
- First life originated as single cell in oceanic water (salty water).
- According to oparin and Haldane life orignated (up to Eukaryotic cell) in the following phases.
- I. 1st Phase : Atomic phase : Only atoms of each element were present -In earth core - Heavy metals (Fe, Cu, Ni, pb) In earth crust - Si, Na , K, Mg, Al, P, F, Cl In atmosphare - H, He, Ar, N, O, C
- II. 2nd Phase Molecular phase and formation of simple inorganic compound like -
- H₂ most reactive, 90% and make early enviroment highly reactive.
- III. 3rd Phase Formation of first simplest organic compound

CH₄, NH₃,H₂ Water Vapour U.V.Rays, cosmic ray lightning and thundering sugar, N₂bases

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