



The Royal College

SUMMER HOLIDAY
HOMEWORK

SESSION

2025-26

STD-XI Science

Dear Parents and Students,

At the outset, we extend our heartfelt appreciation for the unwavering support, steadfast commitment, positivity and enthusiasm you have brought to the start of this new academic year.

Summer is not just a break, it's a reminder to reconnect with your passions, try a new skill, and spend meaningful moments with your family. Relax, recharge, but manage your time wisely. Stay energized, stay hydrated, and make each day purposeful. Don't let procrastination steal your spark! **"A stitch in time saves nine" take the time now to plan and organize your summer learning. Small efforts early can save you a lot of time later!**

At **The Royal College**, we believe that learning is a journey without a pause. This year's Holiday Homework has been thoughtfully designed to blend academics with creativity, ensuring you remain engaged while enjoying the freedom of summer.

Dear students, this is that time of the year to dive into new realms of thought, ignite your imagination, and create memorable moments. Let your curiosity be your compass as you embark on the adventure of reading captivating books, exploring the world through current affairs, and giving life to your ideas through writing. Push the boundaries of your creativity and ask questions that lead to uncharted discoveries. Watch how growth quietly blooms, when you experiment, explore and evolve.

As the **FIFA Club World Cup 2025** draws near, let the spirit of sportsmanship inspire you. Step outdoors, stay fit, and cultivate healthy habits instead of drifting into endless screen time or unhealthy routines. Let the musician in you strum a melody, the artist in you brings a colourful canvas to life, and the reader in you devour wonderful books, the possibilities are endless!

Your teachers have crated meaningful and engaging assignments not mere tasks, but opportunities to think critically, imagine freely, and showcase your talents. Subject-specific worksheets and project guidelines are available under the respective Subject Cards. Infuse your projects with originality and enthusiasm.

May your summer break be refreshing and unforgettable. We eagerly await your return, filled with new experiences, fresh skills, and smiles as radiant as the summer sun!

HAPPY HOLIDAYS!

English

For your English holiday homework, you are required to prepare a **file project** based on the following four poems:

1. A Photograph
2. The Laburnum Top
3. The Voice of the Rain
4. Childhood

Instructions:

Use **coloured pages** to make your project visually appealing.

Begin each poem's section by **writing the full poem neatly**.

After the poem, include:

A brief introduction about the poet

A summary of the poem in your own words

The **central idea** or theme of the poem

Make sure your file is **well-decorated, neat, and creatively presented**. This project will be assessed for both content and presentation, so put your best effort into it!

Read the chapters from NCERT book and competition notes and understand the concept and solve the given questions based on it in a separate register.

PHYSICS

CHAPTER 1: UNITS AND MEASUREMENTS

PART A SYSTEM OF UNITS

1. What is a unit ? Explain the process of measuring a physical quantity.
2. What do you understand by the unit of measurement ? Show that bigger is the unit, smaller is the numerical value of physical quantity and vice versa. (H.P.S.S.C.E. 2011)
3. What is a standard ? Name the international standards of mass ; length and time.
4. Name the coherent system of units for measuring various physical quantities for mechanics only. Hence, define metre, kilogram and second.
5. What are fundamental units ? State how metre has been defined in terms of wavelength and second in terms of periods of radiation.
6. What is the SI unit of length ? Why this unit is defined in terms of wavelength of light radiation ? (C.B.S.E. 2001)
7. Name the basic and supplementary units of SI. How are the three units of mass, length and time defined on SI ?
8. What are the main characteristics of SI ?
9. Briefly comment on the advantage of atomic standards of length and time over the conventional standards.
10. Name basic units of a system used for measuring all physical quantities. What is meant by tera, nano and femto ?
11. Define the following : (i) Light year (ii) Parsec (iii) Astronomical unit. (H.P.S.S.C.E. 2005)
12. Define astronomical unit, light year and parsec. How are these related to each other ?

PART B DIMENSIONAL ANALYSIS

1. What is meant by dimensions of a physical quantity? What are the dimensional formulae and equations ?
2. Write down the dimensional formula of the following physical quantities : (i) work (ii) angular velocity (iii) pressure (iv) Planck's constant (H.P.S.S.C.E. 2005)
3. Find dimensional formula for angle, angular velocity, angular acceleration, torque and surface tension.
4. Obtain dimensional formula for universal gravitational constant (G), Planck's constant (h) and universal gas constant (R).
5. What do you understand by dimensions of a physical quantity ? Discuss the principle of homogeneity of dimensions, giving an example.
6. Find the dimensional formula of Planck's constant and universal gravitational constant.
7. What are the uses of dimensional analysis ? Derive the formula used for conversion of one system of units into another. (H.P.S.S.C.E. 2009 S)
8. Define dimensional formula. Give uses of dimensional analysis. (H.P.S.S.C.E. 2005)
9. Write down the limitations of dimensional analysis. (H.P.S.S.C.E. 2005)
10. Name the various advantages and limitations of dimensional analysis.

PART C ERROR ANALYSIS

1. What is meant by significant figures ? How are these counted ?
2. State the different types of errors present in a measurement. State and discuss the normal law of random errors.
3. Define the terms (i) mean absolute error, (ii) relative error and (iii) percentage error. How are they calculated ?
4. What is random error ? Explain, with an example how this error can be estimated.
5. What do you understand by least count or instrumental error ? Explain, with an example how an extreme percentage error can be estimated from the resolutions of the quantities involved.
6. Define error. Discuss the combination of errors, when the final result is equal to sum of two observed quantities.
(H.P.S.S.C.E. 2009 S)
7. Define significant figures. Discuss the combination of errors, when the final result is equal to difference between two observed quantities.
(H.P.S.S.C.E. 2009 S)

CHAPTER 2 MOTION IN A STRAIGHT LINE

PART A MOTION IN A STRAIGHT LINE

1. What is the difference between speed and velocity ? Show that the slope of displacement-time graph is equal to the velocity of uniform motion. (H.P.S.S.C.E. 2009)
2. Define uniform velocity of an object moving along a straight line. What will be the shapes of velocity-time and position-time graphs of such a motion ?
3. How the uniform velocity of an object moving along a straight line may be found from the position-time graph of the object ? Obtain the formulae for position of the object (i) at any time t in terms of its position at $t = 0$ and uniform velocity and (ii) at any time t' in terms of its position at another time t and uniform velocity.
4. Draw velocity-time graph of uniform motion and prove that the displacement of an object in a time interval is equal to the area under velocity-time graph in that time interval. (H.P.S.S.C.E. 2009, 2000)
5. Show that the area under velocity-time graph of an object moving with constant acceleration in a straight line in certain time interval is equal to the displacement of the object in that time interval. (H.P.S.S.C.E. 2009 S)
6. Define relative velocity of an object *w.r.t.* another. Draw position-time graphs of two objects moving along a straight line, when their relative velocity is (i) zero and (ii) non-zero. (H.P.S.S.C.E. 2006)
7. What do you mean by relative velocity of an object *w.r.t.* another ? Obtain an expression for the relative position of the two objects at any time t in terms of their velocities and positions at time $t = 0$, when motion takes place along a straight line.
8. An object has uniformly accelerated motion in a straight line. Define average velocity for the motion of the object and hence obtain expression for position and velocity of the

object at any time t' in terms of its those at any other time t . Given that initial position and initial velocity of the object are x_0 and u respectively.

9. For an object moving in a straight line with constant acceleration, plot the velocity-time and position-time graph for its motion.
10. From the velocity-time graph of a uniformly accelerated motion, deduce the equations of motion between (i) velocity and time (ii) distance and time (iii) distance and velocity.
11. Deduce the following relations for motion of an object along a straight line with constant acceleration :
 - (i) $v' = v + a (t' - t)$,
 - (ii) $x' = x + v (t' - t) + \frac{1}{2} a (t' - t)^2$,
 - (iii) $v'^2 - v^2 = 2 a (x' - x)$;(H.P.S.S.C.E. 2003)
where the letters have their usual meanings.
12. Derive an expression for the distance travelled by a uniformly accelerated body in t seconds. Also derive an expression for the distance travelled by the body in the n th second. (C.B.S.E. 1999)
13. Deduce the following relations analytically for a uniform motion along a straight time, where the terms have their usual meanings :
 - (i) $v = u + a t$
 - (ii) $S = u t + \frac{1}{2} a t^2$
 - (iii) $v^2 - u^2 = 2 a S$
14. Define average and instantaneous velocity. Derive the relation :

$$S_{nth} = u + \frac{a}{2} (2 n - 1),$$

for uniformly accelerated motion of the particle.

(H.P.S.S.C.E. 2009 S)

PART B VECTORS

1. How will you add (a) two vectors and (b) more than two vectors graphically ? What do you understand by resultant of two vectors ?
2. State the triangle law, parallelogram law and polygon law of addition of vectors. Show that triangle law of addition of vectors is basic law of addition of vectors.
3. State parallelogram law of vector addition. Find the magnitude and direction of the resultant of two given vectors inclined at an angle θ .

(H.P.S.S.C.E. 2007 S, 2003, 2001)

4. State parallelogram law of vector addition. Using the law, derive expressions for magnitude and direction of the resultant of two vectors inclined at an angle θ . What will be the magnitude and direction, if $\theta = \pi/2$?

(H.P.S.S.C.E. 2007)

5. State parallelogram law of vector addition. Find the magnitude and direction of the resultant of two vectors \vec{A} and \vec{B} inclined at an angle θ with each other by using this law.

(H.P.S.S.C.E. 2010 S, 2009)

6. State parallelogram law of vector addition and find the magnitude of the resultant of two vectors \vec{A} and \vec{B} inclined at an angle θ analytical method for finding its resultant, when the two vectors are inclined at an angle θ with each other. What happens, when $\theta = 0^\circ$ and $\theta = 90^\circ$?

(H.P.S.S.C.E. 2006)

7. Two vectors are inclined at an angle θ . Show how would you add these two vectors analytically. Discuss the special cases, when (i) $\theta = 0^\circ$, (ii) $\theta = 90^\circ$ and (iii) $\theta = 180^\circ$.
8. How is relative velocity of a body A w.r.t. another body B determined, when the two are moving in two different directions inclined at angle θ .

NUMERICALS ON VECTORS

Type A. On Addition of Vectors

1. Consider two displacements, one of magnitude 3 m and another of magnitude 4 m. Show how the displacement vectors should be combined to get a resultant displacement of magnitude (i) 7 m (ii) 1 m and (iii) 5 m.
[Ans. (i) $\theta = 0^\circ$ (ii) $\theta = 180^\circ$ (iii) $\theta = 90^\circ$]
2. A body moves in such a way that it has a displacement of 12 m towards east, 5 m towards the north and then 9 m vertically upwards. Compute the magnitude of its resultant displacement. [Ans. 15.81 m]
3. Add a force of 8 N directed northwards to a force of 6 N directed westwards and calculate the magnitude and direction of resultant with north.
[Ans. 10 N ; $36^\circ-52'$ (west of north)]
4. Add a velocity of 30 m s^{-1} eastwards to a velocity of 40 m s^{-1} northwards and calculate the magnitude and the direction of the resultant with the east.
[Ans. 50 m s^{-1} ; $53^\circ-8'$ (north of east)]
5. Two vectors of magnitude 9 and 7 are inclined to each other at 60° . Calculate the magnitude of the resultant. At what angle is the resultant inclined to the vector of magnitude 9 ?
[Ans. 13.9, $25^\circ-52'$]
6. Resultant of two equal forces acting at right angles to each other is 1,414 dyne. Find the magnitude of each force.
(H.P.S.S.C.E. 2006 S) [Ans. 1,000 dyne]
7. Two equal velocities have a resultant equal to $3/2$ times the value of either velocity. Find the angle between them.
[Ans. $82^\circ-49'$]
8. Two forces, whose magnitude are at the ratio of 3 : 5 give a resultant of 35 N. If angle of inclination is 60° , find magnitude of each force
(H.P.S.S.C.E. 2004)
[Ans. 15 N, 25 N]
9. At what angle the two forces $A + B$ and $A - B$ act, so that their resultant is $\sqrt{3A^2 + B^2}$? (H.P.S.S.C.E. 2010, 2004) [Ans. 60°]
10. The vector sum of two vectors \vec{P} and \vec{Q} is \vec{R} . If vector \vec{Q} is

reversed, the resultant becomes \vec{S} . Then, prove that

$$R^2 + S^2 = 2(P^2 + Q^2)$$

11. Two forces P and Q acting at a point at an angle θ have their resultant $(2n+1)\sqrt{P^2 + Q^2}$ and when at an angle $(90^\circ - \theta)$, the resultant is $(2n-1)\sqrt{P^2 + Q^2}$. Show that

$$\tan \theta = (n-1)/(n+1)$$

12. A vector \vec{X} , when added to two vectors $\vec{A} = 3\hat{i} - 5\hat{j} + 7\hat{k}$ and $\vec{B} = 2\hat{i} + 4\hat{j} - 3\hat{k}$ gives a unit vector along Y-axis as their resultant. Find the vector \vec{X} .

$$[\text{Ans. } -5\hat{i} + 2\hat{j} - 4\hat{k}]$$

Type B. On Relative velocity

13. A man is going due east with a velocity of 3 km h^{-1} . Rain falls vertically downwards with a speed of 10 km h^{-1} . Calculate the angle at which he should hold his umbrella so as to save himself from rain.

$$[\text{Ans. } 16^\circ - 42' \text{ east of vertical}]$$

14. If a shower of rain appears to be falling vertically downwards with a speed of 12 km h^{-1} to a person walking due east with a speed of 5 km h^{-1} , what is the actual direction of the rain? $[\text{Ans. } 22^\circ - 37' \text{ west of vertical}]$

Miscellaneous Problems

15. If \vec{A} , \vec{B} and \vec{C} are consecutive vectors forming a triangle, show that $\vec{A} + \vec{B} + \vec{C} = \vec{0}$.
16. The stream of the river Jamuna is flowing with a speed of 1 km h^{-1} . What should be the direction of the swimmer to cross the river straight, his speed being 2 km h^{-1}
 $[\text{Ans. } 120^\circ \text{ with the direction of flow of river}]$
17. A river one kilometre wide is flowing at 3 km h^{-1} . A swimmer, whose velocity in still water is 4 km h^{-1} , can swim only for 15 minutes. In what direction should he strike out

BIOLOGY

CHAPTER: THE LIVING WORLD

1. What is the concept of biodiversity?
2. Differentiate between living and non-living organisms.
3. Define the term 'species'. Why is it important in biology?
4. What is the binomial nomenclature system? Who proposed it?
5. Explain the major characteristic features of living organisms.
6. What are the three domains of life? Discuss each briefly.
7. What is meant by 'taxonomy'? Why is it important?
8. Differentiate between systematic and taxonomy.
9. Explain the role of a taxonomist.
10. What are the various ranks of classification in biological classification systems?
11. What are the different kingdoms in the five-kingdom classification system?
12. Discuss the importance of the five-kingdom classification system.
13. What is a phylogenetic tree? Explain its significance in understanding evolutionary relationships.
14. What is the role of molecular data in taxonomy?
15. How is the scientific name of an organism written according to the binomial nomenclature system?
16. What is the significance of a species name in the binomial nomenclature system?
17. What are the differences between prokaryotes and eukaryotes?
18. What are viruses, and why are they considered non-living organisms?
19. How does the classification of living organisms help in understanding their evolutionary relationships?
20. What are the factors that help in defining the concept of 'living'?

CHAPTER CHEMICAL COORDINATION AND INTEGRATION

1. What is the main function of the endocrine system in chemical coordination?
2. Differentiate between endocrine and exocrine glands.
3. What are hormones and how do they function in the body?
4. How do hormones affect target cells?

5. What is the role of the hypothalamus in hormonal regulation?
6. Explain the relationship between the hypothalamus and the pituitary gland.
7. What are the major hormones secreted by the thyroid gland?
8. What is the significance of the feedback mechanism in hormone regulation?
9. How does insulin control blood sugar levels?
10. Describe the action of adrenaline and its role in the fight-or-flight response.
11. What is the function of antidiuretic hormone (ADH) and where is it secreted?
12. Explain the role of the parathyroid hormone (PTH) in calcium homeostasis.
13. What is the function of glucagon, and how does it interact with insulin in blood glucose regulation?
14. How do sex hormones (estrogens, progesterone, and testosterone) influence human physiology?
15. Describe the function of melatonin and its relation to the sleep-wake cycle.
16. What is the role of cortisol in the body's stress response?
17. What are the effects of hyperthyroidism and hypothyroidism on the body?
18. Explain what diabetes mellitus is and how it affects the body's chemical coordination.
19. What is Addison's disease and how does it impact hormone production?
20. How does hyperparathyroidism lead to bone degradation and other health issues?

CHAPTER: NEURAL CONTROL AND COORDINATION

1. What is the primary function of the nervous system in the human body?
2. How do neurons communicate with each other?
3. What are the three main parts of a neuron, and what role does each part play?
4. What is the difference between a sensory neuron, a motor neuron, and an interneuron?
5. How does an action potential travel along a neuron?
6. What is the role of the myelin sheath in the conduction of nerve impulses?
7. What is a synapse, and how does neurotransmission occur at the synaptic cleft?
8. What is the significance of neurotransmitters in the nervous system?
9. Explain the difference between the central nervous system (CNS) and the peripheral nervous system (PNS).
10. What are the major components of the brain and their respective functions?
11. How do the autonomic and somatic nervous systems differ in terms of function and control?

12. What is the role of the spinal cord in neural control and coordination?
13. Describe the process of a reflex arc and its significance in the nervous system.
14. What is the function of the medulla oblongata in the brainstem?
15. How does the hypothalamus regulate homeostasis in the body?
16. What is the role of the sympathetic and parasympathetic nervous systems in regulating body functions?
17. How do sensory receptors work to detect stimuli in the environment?
18. What is the function of the cerebellum in motor control and coordination?
19. How do hormones and the nervous system work together to maintain coordination and homeostasis in the body?
20. What is the process of learning and memory formation from a neural perspective?

CHAPTER: BREATHING AND EXCHANGE OF GASES

1. What is the process of respiration, and how is it different from breathing?
2. Define external respiration and internal respiration.
3. Explain the term 'breathing' in the context of gas exchange.
4. What is the role of the diaphragm in the process of breathing?
5. Describe the structure and function of the alveoli in the lungs.
6. How is oxygen transported in the blood?
7. What is the role of haemoglobin in oxygen transport?
8. Explain the process of inspiration and expiration.
9. What is tidal volume and how is it different from vital capacity?
10. How does the partial pressure of oxygen and carbon dioxide affect gas exchange?
11. How is carbon dioxide transported in the blood?
12. Explain the mechanism of oxygen and carbon dioxide exchange at the alveolar-capillary membrane.
13. What is the role of surfactant in the alveoli?
14. Describe the process of diffusion in the exchange of gases in the lungs.
15. What are the factors that affect the rate of diffusion of gases?
16. How does the structure of the respiratory membrane facilitate gas exchange?
17. What is emphysema, and how does it affect gas exchange?
18. How does asthma impact the process of breathing and gas exchange?

19. What is the effect of carbon monoxide poisoning on oxygen transport?
20. How does the body compensate for low oxygen levels in high altitudes?

CHAPTER: BODY FLUIDS AND CIRCULATIONS

1. What is the primary function of the circulatory system?
2. What are the main components of blood?
3. How does blood flow through the heart?
4. What is the difference between arteries, veins, and capillaries?
5. What is plasma, and what role does it play in circulation?
6. What are red blood cells and how do they contribute to circulation?
7. Why is haemoglobin important for the transport of oxygen?
8. What is the function of white blood cells in circulation?
9. What is the role of platelets in the circulatory system?
10. How does the lymphatic system assist with circulation?
11. What is the significance of the blood-brain barrier in circulation?
12. What is the role of the kidneys in regulating body fluid balance?
13. What are the major factors that affect blood pressure?
14. What is cardiac output, and how is it measured?
15. How do the lymphatic vessels differ from blood vessels?
16. What is osmosis, and how does it relate to body fluid movement?
17. What happens during edema, and what causes fluid retention in tissues?
18. How do the kidneys maintain fluid and electrolyte balance?
19. How does the circulatory system respond to changes in body temperature?
20. What is the significance of the systemic and pulmonary circulations in the body?

CHEMISTRY

CHAPTER: SOME BASIC CONCEPTS OF CHEMISTRY

SHORT ANSWER QUESTIONS

1. What do you understand by the terms element, compound and mixture ? Give two examples in each case.
2. Explain the term mole. What does one mole of ammonia represent ?
3. Give the SI units for (i) volume (ii) speed and (iii) force.
4. What do you understand by the terms (i) empirical formula and (ii) molecular formula ? How are they related to each other ? Illustrate with an example.
5. Define molarity. What does 1 M solution of sodium carbonate mean ?
6. Classify the following into elements, compounds or mixtures :
(i) Water (ii) milk (iii) tea (iv) iron (v) sugar (vi) smoke (vii) sulphur (viii) 22 carat gold (ix) iodised table salt (x) gasoline.
7. What are homogeneous and heterogeneous mixtures ? Which of the following are homogeneous ?
(a) tap water (b) wood (c) soil (d) smoke (e) cloud.
8. When two substances A and B are mixed together in a pestle and mortar, a large amount of heat is evolved and a new substance C is formed. C has the properties different from A and B. Is C an element, compound or a mixture?
9. State the following :
(i) atomic mass (ii) gram atomic mass (iii) gram molar volume.
10. How would you recover
(i) iodine from a mixture of iodine and salt?
(ii) sulphur from a mixture of carbon and sulphur ?
11. State Avogadro's hypothesis. In what way, has it given support to Dalton atomic theory ?
12. How can you deduce the atomicity of hydrogen with the help of Avogadro's hypothesis ?
13. State the following laws of chemical combination and give one example in each case
(i) Law of constant composition.
(ii) Law of multiple proportions.

14. What do you understand by a balanced chemical equation ? What quantitative information does a balanced chemical equation convey ?
15. Explain (i) molarity (ii) limiting reagent.
16. Write the balanced chemical equations for the following reactions :
- (i) Manganese dioxide and concentrated hydrochloric acid.
 - (ii) Sodium thiosulphate and iodine.
 - (iii) Copper and dilute nitric acid.
 - (iv) Sulphur dioxide and hydrogen sulphide.
17. Write the empirical formulae of the compounds having the following molecular formulae :
- (i) C_6H_6 (ii) C_6H_{12} (iii) H_2O_2 (iv) H_2O
 - (v) Na_2CO_3 (vi) B_2H_6 (vii) N_2O_4 .
18. Balance the following equations :
- (i) $H_3PO_3 \longrightarrow H_3PO_4 + PH_3$
 - (ii) $Ca + H_2O \longrightarrow Ca(OH)_2 + H_2$
 - (iii) $Fe_2(SO_4)_3 + NH_3 + H_2O \longrightarrow Fe(OH)_3 + (NH_4)_2SO_4$
19. What do you understand by the term formula mass ? How does it differ from molecular mass ?
20. Which of the following has (i) maximum (ii) minimum mass ?
- (a) 1 gram atom of C
 - (b) 1 a.m.u. of an atom
 - (c) 1 gram mole of sulphur dioxide
 - (d) 6.02×10^{20} atoms of nitrogen.

LONG ANSWER QUESTION

1. State the law of conservation of mass. How is it verified experimentally ?
2. What are laws of chemical combinations ? Discuss any three laws in detail.
3. Why is it necessary to balance a chemical equation ? Outline briefly the various steps for balancing a chemical equation by hit and trial method.
4. Write short notes on
 - (i) Limiting reagent
 - (ii) Avogadro hypothesis
 - (iii) Dalton's atomic theory.
5. How is mole related to
 - (i) mass
 - (ii) volume and
 - (iii) number of molecules of a substance ?
6. Complete the following :

$$\text{CaH}_2 + 2\text{H}_2\text{O} \longrightarrow \text{Ca(OH)}_2 + 2\text{H}_2$$

(a)	2 moles	.....	.....	.....
(b)	..... g	.....g	.....g	.....2g.
(c)	..... H	..... H	6×10^{23} H	..... H
	atoms	atoms	atoms	atoms
(d)	6×10^{20}	.....total	.....total	.....total
	total	atoms	atoms	atoms
7. What are the main postulates of Dalton's atomic theory ? What were its limitations ? How has the theory been modified ?
8. Define Avogadro number and mole. What is their importance ?

9. What are the essentials of a chemical equation ? What is the information conveyed by a chemical equation ?
10. Explain the following :
- (a) Gay Lussac law
 - (b) Law of definite composition
 - (c) Empirical and molecular formula
 - (d) Relation between mole and volume of gases
 - (e) Limiting reagent.

CHAPTER: STRUCTURE OF ATOM

1. List some important postulates of Bohr's model of an atom.
2. How does the existence of line spectra support for the Bohr model of the atom ?
3. Why was Bohr model abandoned ?
4. In terms of Bohr theory of the structure of the atom, why is it that electrons do not spiral into the nucleus ?
5. Name the three quantum numbers which are necessary to describe an orbital. What are the permitted values for these ?
6. What is the maximum number of electrons in :
 - (i) a principal quantum number
 - (ii) an orbital
 - (iii) *p*-subshell
 - (iv) *s*, *p* and *d*-subshells in an atom ?

7. Give the number of orbitals in :
 - (i) a p -subshell
 - (ii) a d -subshell
 - (iii) second shell.
8. Describe the orbital with the following quantum numbers :
 - (i) $n = 1, l = 0$ (ii) $n = 2, l = 1, m = 0$
 - (iii) $n = 3, l = 2$ (iv) $n = 4, l = 1$
 - (v) $n = 3, l = 0, m = 0$ (vi) $n = 3, l = 1$
9. Give the electronic configurations of :
 - (i) Scandium ($Z = 21$)
 - (ii) Chromium ($Z = 24$).
10. How many orbitals and how many electrons are there in each of the first two principal quantum numbers ?
11. Give the electronic configurations of the following ions :
 - (i) H^- (ii) Na^+
 - (iii) F^- (iv) Mg^{2+} .
12. Fill in the blanks :
 - (i) The size of an orbital is dependent on the value of
 - (ii) The orbitals having the same energies are called
 - (iii) The number of unpaired electrons in carbon is and in nitrogen is
 - (iv) The shape of $1s$ -orbital is
 - (v) filled orbitals have extra stability.
13. Define Aufbau principle. Which of the following orbitals are possible ?
 $1p, 2s, 2p$ and $3f$
14. With the help of Pauli's exclusion principle and the concept of atomic numbers for orbitals, show that an M shell cannot accommodate more than 18 electrons.
15. What is an orbital ? How will you differentiate between an orbit and an orbital ?
16. Compare the shapes of $1s$ - and $2s$ -orbitals.
17. What is the difference between the symbols l and L ?
18. How many electrons are there in the valence quantum level of copper (atomic number = 29) atom ? Give reasons.
19. Write the electronic configurations of the following elements :
 Carbon ($Z = 6$), neon ($Z = 10$), magnesium ($Z = 12$), chlorine ($Z = 17$), calcium ($Z = 20$), chromium ($Z = 24$), iron ($Z = 26$) and rubidium ($Z = 37$).
20. Identify the atoms that have the following ground state electronic configurations :
 - (i) $1s^2 2s^2 2p^6 3s^2$
 - (ii) $1s^2 2s^2 2p^5$
 - (iii) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10}$.

21. In building up of the atoms, the filling of $4s$ -orbital takes place before the $3d$ -orbital. Explain.
22. The expected electronic configuration of copper is $[\text{Ar}] 3d^9 4s^2$ though actually it is $[\text{Ar}] 3d^{10} 4s^1$. Give reasons.
23. An atom of an element has 19 electrons. Find out :
 - (a) its atomic number
 - (b) total number of s -electrons
 - (c) total number of p -electrons.
24. Give the shapes of s and p -orbitals.
25. What is Hund's rule of maximum multiplicity ? Illustrate this by taking the example of $253/999$
26. Explain why half-filled and completely-filled orbitals have extra stability.
27. What is Aufbau principle ? Write the electronic configurations of the elements of atomic numbers 16, 20, 24 and 35.
28. Draw the shape of an orbital which has $l = 0$.
29. State Aufbau principle. Write electronic configurations of the elements with atomic numbers 17 and 24.
30. Why in the building of the atom, the filling of $4s$ -orbital takes place before $3d$ -orbital ?
31. State and explain Pauli's exclusion principle. Write the electronic configuration of the element with atomic number 24.
32. What is Hund's rule of maximum multiplicity ? Explain by taking an example of nitrogen.
33. Discuss the significance of magnetic quantum number.
34. What is the experimental evidence in support of the idea that electronic energies in an atom are quantized ?
35. The effect of uncertainty principle is significant only for motion of microscopic particles and is negligible for the macroscopic particles. Justify the statement with the help of a suitable example.

1. Give the essential postulates of Bohr's model of an atom. How did it explain
(i) the stability of an atom
(ii) origin of spectral lines in hydrogen atom ?
2. What are quantum numbers ? What permitted values can these have ? Give the significance of each quantum number.
3. What is photoelectric effect ? State the result of photoelectric effect experiment that could not be

explained on the basis of laws of classical physics. Explain this effect on the basis of quant of electromagnetic radiations.

4. Why was a change in the Bohr Model of atom required? Due to which important development (s), concept of movement of an electron in an orbit was replaced by, the concept of probability of finding electron in an orbital ? What is the name given to the changed model of atom?
5. (a) What is radial probability distribution curve? Draw radial probability distribution curves for 1s and 2s orbitals.
(b) Discuss the similarities and differences between 1s and 2s orbitals.
(c) How many nodes are present in 1s and 2s orbitals?
6. (a) How many orbitals are possible for a *d*-subshell?
(b) Draw the shapes of d_{xy} and $d_{x^2-y^2}$ orbitals? What is common between these and what is difference between these orbitals? What is the angle between the lobes of these orbitals?
(c) Name a 3*d* orbital which has electron density along all the three axes.

MATHEMATICS

Practice all the given questions from R.D Sharma book of Mathematics.

1) Trigonometric Functions

Page no.5.16, Ex-5.1, Q5, Q7, Q8, Q10, Q12

Page no.5.34, Ex-5.3, Q3 (All the parts), Q8 (ixia)

Page no.7.18, Ex-7.1, Q12 (All the parts), Q14 (ixia)

Page no.8.15, Ex-8.2, Q10, Q12, Q14, Q17, Q18, Q19

Page no.9.25, Ex-9.1, Q11, Q14, Q16, Q20, Q24, Q25

2) Complex Numbers

Page no.10.28, Ex-10.2, Q2(i, ii, iv), Q4(ii, iv), Q8, Q10, Q13

Page no. 10.34, Ex-10.3, Q1 (All the parts)

Page no.10.49, Ex-10.4, Q2, Q3 (All the parts)

3) Linear Inequalities

Page no. 11.14, Ex-11.2, Q15, Q16, Q17, Q21

Page no.11.20, Ex-11.3, Q3, Q5, Q6, Q8

4) Sequence and Series

Page no.15.14, Ex-15.2, Q1 (All the parts), Q3 (ii, iv, v), Q4, Q6 (i, ii, iv), Q8, Q11, Q12, Q14, Q17

Page no.15.20, Ex-15.3, Q1 to Q9

Page no.15.30, Ex-15.4, Q2 (All the parts), Q3, Q5, Q6, Q8, Q11, Q16, Q20

Page no. 15.41, Ex-15.5, Q1 (i, iii, v), Q2, Q3

MOST IMPORTANT:

- **DO A GOOD SOCIAL WORK PER WEEK, CLICK PICTURES, PASTE AND WRITE IT IN THE SCRAPBOOK.**
- **PLANT A SAPLING ON “WORLD ENVIRONMENT DAY” (5 JUNE), CLICK A PICTURE WITH IT AND WRITE A PARAGRAPH ON WORLD ENVIRONMENT DAY. PASTE IT IN THE SCRAPBOOK.**
- **90% OF THE HOMEWORK IS OFFLINE. PLEASE DON'T USE MOBILE PHONES.**

**For any query, please connect Mr. Devansh Kohli between
11:00 am to 12:00 noon on 7906097284.**