



**SAINIK SCHOOL REWARI**  
**VACATION WORK (2019-20)**  
**CLASS - XI**

***Instructions to be followed for cadets:***

1. Do all the Vacation Work in one Notebook only.
2. Do the work in notebook in a sequence as mentioned below:-
  - (i) English, Hindi, Maths, Science, Social Studies for classes VI –X
  - (ii) English, Maths, Physics, Chemistry Bio/Computer for classes XI-XII
3. Vacation Work should be done neatly and efficiently. It will be duly marked as a part of your assessment.
4. Any additional chart paper/Map /Model if any required in vacation work, should be submitted separately along with vacation work note book.
5. Do not get up late. Rise at the usual time and go for a morning walk, or play a game that interests you. Talk about things you see around. Plan some outdoor and indoor games. Spend some time on a hobby.
6. Read newspaper. Keep yourself updated. Reading from colourful illustrated story books will develop your language skills. Listen to stories from family members and try to narrate the stories you have read from various story books.
7. Assign a permanent workplace and a work-time. This brings in discipline in your life. If there is a subject you are weak in, try and work on improving that weakness. You will be more confident when you go back to school.
8. Inculcate good manners – 4 magic words `Please, Thank you, Excuse me, Sorry' – Use them and see the difference.
9. Do not spend time playing video games or using the smart phone, they tend to numb your senses and are a pure mechanical activity on hot summer afternoon, try playing scrabble or chess. Your vocabulary as well as concentration power will improve.

## **ENGLISH**

1. Write 10 Letters (2 Letters to the Editor, 4 Business Letters, 2 Applications for Job, and 2 Official Letters) on the topics of your choice as per the formats and language discussed in the classroom.
2. Write articles on the following topics:
  - (a) Need of Technology in Education
  - (b) Global Warming: A Great Threat to Environment
  - (c) Improvement of English Spoken Skills is a Must in Today's World
3. Write book review of a book which you will read during the vacation.
4. Write summaries of the chapters which have been taught in the class so far. Each summary should be written in around 150-300 words.
5. Write 20 new words daily (approximately 800 words) with their synonyms and antonyms.
6. Prepare lecturette on the topics of social, economic, world politics.

## **MATHS**

1. NCERT examples and questions of Chapter 1 and 2.
  - (a) Chapter 1: Sets
  - (b) Chapter 2: Relation and Function
2. Practice all the questions:  
Solve objective type questions from NDA Pathfinder Book
  - (a) Chapter 1- Sets (50 Question)
  - (b) Chapter2-Relation and Function (50 Question)
3. Learn all Trigonometric Formulas.
4. Do first 50 subjective type questions from R.D Sharma from the following chapters.
  - (a) Sets
  - (b) Relation & Function.
5. Make a pocket Maths dictionary covering the definitions, facts and formulae of all the concepts of class XI. The following units should be covered:
  - (a) Sets and functions
  - (b) Algebra
  - (c) Calculus

## **PHYSICS**

1. NCERT examples and questions of Chapter 1, 2 and 3
  - (a) Chapter 1: Physical World

- (b) Chapter 2: Units and Dimensions  
(c) Chapter 3: Motion in straight line
2. Project report on one any topic of class XI.
3. Do the following questions:
- (a) Derive the equations of motion using calculus method.
- (b) Define a projectile. Derive expressions for (a) time of flight, (b) maximum height, (c) horizontal range, for a projectile thrown at an acute angle to the horizontal.
- (c) Derive an expression for the distance travelled by a body in the  $n$ th second.
- (d) A ball is dropped from the roof of a building. An observer notes that the ball takes 0.1 s to cross a window 1 m in height. After crossing the window, the ball takes another 1.00 s to come to the bottom of the building. What is the height of the building?
- (e) To a man walking at the rate of 3km/hour the rain appears to fall vertically downward. When he increases his speed to 6 km/hour, it appears to meet him at an angle of 30 degree with the downward vertical. Find the real direction and speed of rain as seen by a stationary observer.
- (f) A particle moves such that its displacement varies with time according to the relation  $S = 12t - 2t^2$  . Find distance travelled in 4 s.
- (g) A ball slides off a horizontal table top 1.25 m high, with a velocity of 4 m/s. Find the horizontal distance from the edge of the table at which the ball strikes the ground.
- (h) A body is projected with a velocity of 10 m/s at an angle of 30 degrees with the horizontal. (a) Calculate the time taken to reach the maximum height, (b) its velocity after 0.7 s.
- (i) A particle starts its motion with an acceleration of  $a = 2t$ , where 't' is time. Find its velocity and displacement after 3 seconds.
- (j) A particle starts with acceleration  $a = 2s$ , where 's' is its displacement as measured from a fixed origin. Find its velocity when its displacement is 4 m.

### **CHEMISTRY**

1. The empirical formula and molecular mass of a compound are  $\text{CH}_2\text{Cl}$  and 99g respectively. What will be the molecular formula of the compound?

2. Calculate number of moles in (i) 45.4 litres of sulphur dioxide at N.T.P. (ii)  $6.022 \times 10^{22}$  molecules of oxygen (iii) 8g of calcium.
3. Calculate number of atoms in (i) 0.25 mole atoms of carbon (ii) 0.20 mole molecules of oxygen.
4. Calculate (a) Mass of 2.5g atoms of magnesium. (At mass of Mg = 24u)  
(b) Mass of 0.72 gram molecules of CO<sub>2</sub> (at mass of C=12 u , O = 16u)
5. A solution has been prepared by dissolving 60g of methyl alcohol in 120g of water. What is the mole fraction of methyl alcohol and water?
6. An organic compound on analysis gave the following percentage composition; C=57.8%, H=3.6% and the rest is oxygen. The molecular mass of the compound was found to be 166. Find out the molecular formula of the compound.
7. 3M solution of NaNO<sub>3</sub> has density 1.25g/l. Calculate its molality. (M M of NaNO<sub>3</sub>=85gmol<sup>-1</sup>)
8. How many moles of Nitrogen are needed to produce 8.2 moles of Ammonia by reaction with Hydrogen?
9. Calculate molarity of a solution containing 13.8g of potassium carbonate (molar mass =138g/mol) dissolved in 500ml of solution.
10. Calculate the molarity and molality of 93% H<sub>2</sub>SO<sub>4</sub> (weight/volume). The density of the solution is 1.84 g/cc.
11. Write the relationship between empirical formula and molecular formula.
12. How are 0.5 mol Na<sub>2</sub>CO<sub>3</sub> and 0.5 M Na<sub>2</sub>CO<sub>3</sub> different from each other ?
13. Why molality is preferred over molarity of a solution ?
14. Calculate the present of carbon, hydrogen and oxygen in ethanol (C<sub>2</sub>H<sub>5</sub>OH)
15. A compound made up of two elements A and B has A = 70%, B = 30%. Their relative number of moles in the compound is 1.25 and 1.88, calculate :
  - (a) Atomic masses of the elements A and B
  - (b) Molecular formula of the compound , if its molecular mass is found to be 160.
16. The reaction  $2C + O_2 \rightarrow 2CO$  is carried out by taking 24.0 g of carbon and 96.0 g of O<sub>2</sub>. Find out.
  - (a) Which reactant is left in excess ?
  - (b) How much of it is left ?
  - (c) How many grams of the other reactant should be taken so that nothing is left at the end of the reaction ?

17. Which aqueous solution has higher concentration, 1 molar or 1 molal solution of the same solute? Give reason.

### **STRUCTURE OF ATOM**

1. Explain why electronic energy is negative.
2. Calculate the wavelength of an electron moving with a velocity of  $10^3$  m/s
3. A moving electron has  $3 \times 10^{-25}$  joules of kinetic energy. What is the de Broglie wavelength?
4. (a) Which quantum no. determines (i) energy of an electron, (ii) orientation of orbital?  
(b) Which shell would be the first to have 'g' sub shell?  
(c) Which orbital is non directional?
5. Explain why atoms with half filled and full filled orbitals have extra stability. Write down the electronic configuration of: Si(14), Cr (24), Cu(29), Xe (54)
6. Write the electronic configuration of  $\text{Cu}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Cr}^{3+}$ . Also indicate the no. of unpaired electrons present in each case.
7. Write the designation for orbital with the following quantum numbers:  
n = 4; l = 1 b) n = 2; l = 0 c) n = 5; l = 2
8. Yellow light emitted from a sodium lamp has a wavelength of 580 nm Calculate the frequency and wave number.
9. Using Aufbau's principle, write the ground state electronic configuration of the following:  
Ca ( Z=20) b) Mn (Z=25) c) Cu (Z=29) d) Rb (Z=37)
10. Give the values of all the four quantum numbers for 2p electrons in Nitrogen (Z=7)
11. Write the electronic configuration of the elements with Z=17 and predict the number of p electrons b) number of filled orbitals c) number of half filled orbitals
12. (a) Write the values of azimuthal and magnetic quantum numbers for n=2.  
(b) Write the four quantum numbers for 21st electron of Sc (Z=21)
13. From the following sets of quantum numbers, state which are possible:  
(a) n=0, l=0, m=0, s=1/2 (iv) n=1, l=0, m=1, s=1/2  
(b) n=2, l=2, m=0, s=1/2 (v) n=1, l=0, m=0, s=-1/2  
(c) n=2, l=2, m=0, s=-1/2 (vi) n=1, l=1, m=0, s=1/2
14. Neutron or proton of same wavelength, which will have more velocity ?
15. Chlorophyll absorbs radiations of wavelength 700 nm. What is the frequency of this radiation ?
16. The line spectrum of an element is known as fingerprints of its atom. Comment

17. An element has atomic number 30 and mass number 66, what will be the number of protons and neutrons in this atom?
18. What is the value of the Bohr's radius for the first orbit of hydrogen atom ?
19. Distinguish between a photon and a quantum.
20. Which series of lines of the hydrogen spectrum lie in the visible region ?
21. Give the essential postulates of Bohr's model of an atom. How did it explain ?  
(a) the stability of the atom ? (b) origin of the spectral lines in H-atom ?
22. What is quantisation ? How quantisation of energy was introduced in Bohr's model ?
23. What transition in the hydrogen spectrum would have the same wavelength as the Balmer transition  $n = 4$  to  $n = 2$  of  $\text{He}^+$  spectrum?
24. Which one has a higher energy, a photon of violet light with wavelength  $4000 \text{ \AA}$  or a proton of red light with wavelength  $7000 \text{ \AA}$  ?
25. (a) The energy associated with the first orbit in the hydrogen atom is  $-2.18 \times 10^{-18} \text{ J atom}^{-1}$ . What is the energy associated with the fourth orbit ?  
(b) Calculate the radius of Bohr's third orbit for hydrogen atom.
26. Compare the frequency of light radiations emitted when electron falls from 5th shell to the 2nd shell in  $\text{Li}^{2+}$  ion and electron falls from 4<sup>th</sup> shell to the 1st shell in  $\text{He}^+$  ion.
27. Can a moving cricket ball have a wave character ? Justify your answer.
28. Why uncertainty in position is more when uncertainty in velocity is less for an electron ?
29. Calculate the mass of the photon with wavelength of  $3.6 \text{ \AA}$ .
30. Explain why the uncertainty principle is significant only from the motion of subatomic particles and is negligible for macroscopic particles.
31. Calculate the wavelength of a tennis ball of mass 60 gm moving with a velocity of 10 m per second.
32. Calculate the uncertainty in the velocity of a cricket ball of mass 150 g, if uncertainty in its position is of the order of  $1 \text{ \AA}$ .
33. Cricket ball, a tennis ball and a proton which has more uncertainty in velocity and which follows Heisenberg uncertainty principle maximum.
34. What is the lowest value of  $n$  that allows  $g$  orbitals to exist ?
35. How many radial and angular nodes are present in  $2p$  orbital.
36. Using  $s, p, d$  notations, describe the orbital with the following quantum numbers :  
 $n = 4, l = 2$  (b)  $n = 1, l = 0$ . [Ans. (a)  $4d$  (b)  $1s$ ]

37. Cr in ground state has how many unpaired electrons. (Cr, Atomic number = 24).
38. Which has more energy of electron 4p or 5s ?
39. Nitrogen has correct configuration of  $1s^2, 2s^2, 2p_x^1, 2p_y^1, 2p_z^1$  is described by which principle ?
40. What are degenerate orbitals ?
41. List the possible values for all the quantum numbers for the following subshell. (a) 2p (b) 4f
42. Explain why :
  - (a) The three electron present in 2p subshell of nitrogen remain unpaired
  - (b) Cr has configuration  $3d^5 4s^1$  and not  $3d^4 4s^2$ .
43. (a) An atomic orbital has  $n = 2$ . What are the possible values of  $l$  and  $m$  ?
  - (b) List the quantum numbers ( $m_l$  and  $l$ ) of electrons for 3d orbital.
  - (c) Which of the following orbitals are possible ? 2d, 1s, 2p and 3f.

### CLASSIFICATION OF ELEMENTS

1. Consider the following species :  $N^{-3}, O^{-2}, F^{-}, Na^{+}, Mg^{2+}$  and  $Al^{+3}$ 
  - (a) What is common in them?
  - (b) Arrange them in increasing order of ionic radii. Give reason also.
2. (i) Arrange F, Cl, Br, I in increasing order of negative electron gain enthalpy. Also explain the reason of that arrangement.
  - (a) Which is largest in size— $Cu^{+}, Cu^{2+}, Cu$  and why?
  - (b) Which element is more metallic - Mg or Al and why?
3. Account for the following:
  - (a) Mg has higher value of first ionization energy than Al atom.
  - (b) The ionization energy of  $Na^{+}$  is higher than that of Ne although they have the same configuration.
  - (c) Electron gain enthalpy of O is less negative than that of S.
4. Give reasons:
  - (a) First ionization energy of Mg is more than that of Na but second ionization energy of Mg is less than Na.
  - (b) Ionization enthalpy of oxygen is less than N.
5. Which is largest in size  $Al^{+}, Al^{2+}$  and Al, why?
6. Arrange the following in increasing order of ionization enthalpy:- B, C, N, O.

7. Arrange the elements in increasing order of their size:- F<sup>-</sup>, Li<sup>+</sup>, Na<sup>+</sup>, Cl<sup>-</sup>.
8. Which has the highest value of electron gain enthalpy fluorine or chlorine?
9. How are Li and Mg related to each other in the periodic table? Write the name of another pair having such a relationship?
10. Noble gases have zero electron affinity. Why?
11. Account for the low values of electron affinities of nitrogen and phosphorus?
12. (a) Be shows diagonal relationship with which element.  
(b) Which group elements are known as chalcogens.
13. Arrange O<sup>2-</sup>, O<sup>-</sup>, O in decreasing radius (size).
14. 2nd IE is always more than first why ?
15. Electronegativity of F < Cl < Br < I why ?
16. Arrange F, Cl in terms of increasing chemical reactivity.
17. 2nd IE of Na is more than 2nd IE of Mg. Why ?
18. Cations are smaller than neutral atom why anions are larger in size than neutral atom ?
19. Ionization energy of nitrogen is more than .O. and .C. both why ?
20. First ionization energy of boron is less than Be but size of Be is less than Boron. Why ?
21. The reducing power of elements increases down the group but reverse is true for oxidising power along a period. Why ?

### COMPUTER SCIENCE

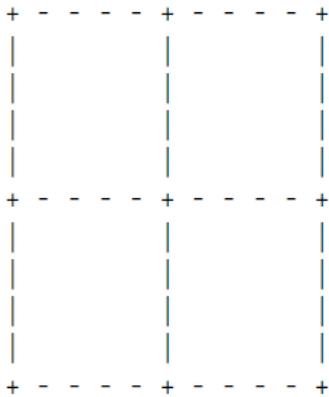
1. Assume that we execute the following assignment statements:  
width = 17 , height = 12.0 , delimiter = '.'  
For each of the following expressions, write the value of the expression and the type (of the value of the expression).  
(a) width/2  
(b) width/2.0  
(c) height/3  
(d) 1 + 2 \* 5  
(e) delimiter \* 5  
  
Use the Python interpreter and the type function to check your answers.
2. Practice using the Python interpreter as a calculator:  
(a) The volume of a sphere with radius  $r$  is  $\frac{4}{3}\pi r^3$ . What is the volume of a sphere with radius 5? Hints: Be sure to execute the statement `pi = 3.1415926535897931` first and 392.6 is wrong!

(b) Suppose the cover price of a book is \$24.95, but bookstores get a 40% discount. Shipping costs \$3 for the first copy and 75 cents for each additional copy. What is the total wholesale cost for 60 copies?

(c) If I leave my house at 6:52 am and run 1 mile at an easy pace (8:15 per mile), then 3 miles at tempo (7:12 per mile) and 1 mile at easy pace again, what time do I get home for breakfast?

3. This exercise3 can be done using only the statements and other features we have learned so far.

Write a function that draws a grid like the following:



Hint: to print more than one value on a line, you can print a comma-separated sequence:

`print('+', '-')`. To have Python leave the line unfinished (so the value printed next appears on the same line), use the following:

```
print('+',end="")
print('-')
```

The output of these statements is '+ -'.

A `print()` call all by itself ends the current line and goes to the next line.

## **BIOLOGY**

1. Each cadet will find out 15 very short answer types questions from the Chapter 1-5 from NCERT Biology Textbook and write down their answers in Holiday home work Note Book.

2. Each Cadets will prepare Investigatory Project from the under given Topics on A 4 size Paper.

- (a) Different types of minerals and their importance to plants.
- (b) Life cycle of cockroach
- (c) Life cycle of housefly
- (d) Classification of plants

### 3. WORKSHEET

- (a) What happens to the plant cell if it is placed in higher water potential?
- (b) A plant cell when kept in a certain solution got plasmolysed. What was the nature of the solution?
- (c) What does capillarity in the xylem depend on?
- (d) What do you understand by the chemical potential of a solute?
- (e) What does the water potential of a solution depend on?
- (f) A potted plant kept in sunlight is shifted to monochromatic red light. How will this affect the rate of photosynthesis?
- (g) What is the difference between chlorophyll a and chlorophyll b?
- (h) How many molecules of ATP are required for the synthesis of glucose in the C<sub>3</sub> , C<sub>4</sub> cycle?
- (i) What are the end products of anaerobic respiration in a plant cell and animal cell? Name the connecting link between glycolysis and TCA cycle.
- (j) Where is O<sub>2</sub> used in the process of respiration?
- (k) Where does the ETS operate in the cell?
- (l) What is the role of the F<sub>0</sub>-F<sub>1</sub> particles in respiration?
- (m) Which intermediate is oxidized during glycolysis to form NADH.H<sup>+</sup>?
- (n) )What is the acceptor molecule in Krebs's cycle?
- (o) Which is the first product in TCA cycle?
- (p) Growth can be measured by an \_\_\_\_\_
- (q) Where are auxins synthesized? \_\_\_\_\_
- (r) Function of auxins are \_\_\_\_\_
- (s) Natural auxins are \_\_\_\_\_ and synthetic auxins are \_\_\_\_\_
- (t) A bioassay for auxin is \_\_\_\_\_
- (u) Define critical period.
- (v) Cut leaves remain green longer if sprayed with \_\_\_\_\_

- (w) Cytokinin was first isolated from \_\_\_\_\_
- (x) The pigment that helps in seed germination is \_\_\_\_\_
- (y) Hormone responsible for photoperiodism is \_\_\_\_\_
- (z) Enlist the conditions for verbalization.