

## **ENGLISH**

1. Give a detailed description of the scene of the classroom. (The Last Lesson)
2. Describe M. Hamel's last day at school.
3. Bring out the difference in the environment of the classroom before and after the announcement.
4. Describe the miserable plight of the people of Firozabad.
5. Bring out the irony and pathos in the story of Anees Jung.
6. Which experience made the writer feel terrified of water?
7. Explain in brief William Douglas' attempt to come out of the pool.
8. How did the instructor help the writer learn swimming?
9. What made the peddler finally change his ways?
10. How does the metaphor of the Rattrap serve to highlight the human predicament?
11. Why is the daughter's decision to let the peddler stay a turning point in the story?
12. Draft an advertisement announcing the opening of a high-profile health club at a posh locality of your city in 50 words.
13. You are Bhusan/Bhavna of 25/A, Defence Colony, Bhubaneswar. You are deeply concerned about the growing apathy of people towards eve-teasing in local buses. Write a letter to the editor of a newspaper expressing your concern and suggesting ways in which women can ensure their own safety. (Word limit: 120-150)
14. Every day you read in the newspaper about the increasing rate of crimes in Delhi. You live in Delhi and feel really bad about it. As Raushan write an article for your school magazine on the topic. (Word limit: 150-200)
15. Your school has arranged a debate competition and you have been nominated by your class to participate. Topic for debate is: "Need of a Hero is essential for National Unity". Highlight your opinion in 150 to 200 words. You are Sohan/Sarda of Bharati School, CDA, Cuttack.

## **MATHEMATICS**

1. Solve all the miscellaneous exercise problems of Units Algebra, Differential Calculus, Integral Calculus, Probability and Statistics, 3 – D Geometry and Vector Algebra.
2. Solve all the Exemplar questions of the Units Algebra, Differential Calculus, Integral Calculus, Probability and Statistics, 3 – D Geometry and Vector Algebra.

## **PHYSICS**

1. Identify the part of the electromagnetic spectrum which is:
  - A. Suitable for radar system used in aircraft navigation.
  - B. Adjacent to the low frequency end of electromagnetic spectrum.
  - C. Produced in nuclear reactions.
  - D. Produced by bombarding a metal target by high speed electrons.

2. Define magnetic moment of a current loop. Write the expression for magnetic moment of a revolving electron in hydrogen atom.
3. A  $800\mu\text{F}$  capacitor is charged by a  $100\text{V}$  battery. How much energy is stored in the capacitor? Determine the charge on the capacitor.
4. Derive an expression of energy possessed by an electron of an atom in its  $n$ th orbit.
5. A potential difference ' $V$ ' is applied to a conductor of length ' $l$ ', and diameter  $D$ . How are the electric field  $E$ , the drift velocity  $V_d$  affected when
  - a.  $V$  is halved
  - b.  $l$  is halved
6. An electron, an  $\alpha$ -particle and proton all have the same kinetic energy. Which of these particles has shortest wavelength? Justify your answer.
7. Derive an expression of electric potential along the axial line at a distance  $r$  from the centre of an electric dipole. What is the nature of potential?
8. Define terminal potential difference. Derive relation with internal resistance. Name the two factors on which internal resistance depends.
9. Show the current lags behind the voltage by  $\pi/2$  radian when alternating emf is applied to a circuit containing an inductor only. Draw the phasor diagram for the circuit.
10. Show the current leads the voltage by  $\pi/2$  radian when alternating emf is applied to a circuit containing a capacitor only. Draw the phasor diagram for the circuit.
11. Two point charges  $q_1$  and  $q_2$  of  $+10^{-8}\text{ C}$  and  $-10^{-8}\text{ C}$  respectively are placed  $0.1\text{ m}$  apart. Calculate the electric fields at a point  $A$  which is midpoint of the line joining 2-charges and at a point  $B$   $0.05\text{ m}$  away from  $q_1$  lying on the same line joining  $q_1$  and  $q_2$  but not in between them.
12. Write the S.I unit of self inductance. Write the factors on which the self-inductance of a solenoid depends.
13. Current in a circuit falls from  $5.0\text{ A}$  to  $0.1\text{ A}$  in  $0.1\text{ s}$ . If the average emf of  $200\text{ V}$  induced, give an estimate of the self inductance of the circuit.
14. With the help of a labelled diagram explain the principle and working of a cyclotron.
15. Show that the cyclotron frequency doesn't depend on the speed of the particle.
16. Derive an expression for the torque acting on a current carrying loop of  $N$  turns suspended in uniform magnetic fields. Then write the expression of maximum torque.
17. The maximum torque acting on a coil of effective area  $0.04\text{ m}^2$  is  $4 \times 10^{-8}\text{ Nm}$ , when the current is  $100\mu\text{ A}$ . Find the magnetic induction in which it is kept?
18. Chapters from 1 to 7 to be covered as per the note given.
19. Solve exercise -1, 2, 3, 4, 7 and in text questions (NCERT) of chapter-1 to 7.
20. Where on earth surface is the value of angle of dip is maximum?

## CHEMISTRY

1. Briefly describe the general characteristics of Group 15 elements with reference to their oxidation state, electronic configuration, atomic size, electronegativity and ionisation enthalpy.

2. Why does the reactivity of nitrogen differ from phosphorus?
3. Discuss the trends in chemical reactivity of group 15 elements.
4. Why does  $\text{NH}_3$  form hydrogen bond but  $\text{PH}_3$  does not?
5. How is nitrogen prepared in the laboratory? Write the chemical equations of the reactions involved?
6. How is ammonia manufactured industrially?
7. Illustrate how copper metal can give different products on reaction with  $\text{HNO}_3$ .
8. Give the resonating structures of  $\text{NO}_2$  and  $\text{N}_2\text{O}_5$ .
9. The HNH angle value is higher than HPH, HAsH and HSbH angles. Why? [Hint: Can be explained on the basis of  $\text{sp}^3$  hybridisation in  $\text{NH}_3$  and only s-p bonding between hydrogen and other elements of the group.
10. Why does  $\text{R}_3\text{P}=\text{O}$  exist but  $\text{R}_3\text{N}=\text{O}$  does not (R = alkyl group)?
11. Explain why  $\text{NH}_3$  is basic while  $\text{BiH}_3$  is only feebly basic.
12. Nitrogen exists as diatomic molecule and phosphorus as  $\text{P}_4$ . Why?
13. Write main differences between the properties of white phosphorus and red phosphorus.
14. Why does nitrogen show catenation properties less than phosphorus?
15. Give the disproportionation reaction of  $\text{H}_3\text{PO}_3$
16. Can  $\text{PCl}_5$  act as an oxidizing as well as a reducing agent? Justify.
17. Justify the placement of O, S, Se, Te and Po in the same group of the periodic table in terms of electronic configuration, oxidation state and hydride formation.
18. Why is dioxygen a gas but Sulphur a solid?
19. Knowing the electron gain enthalpy values for  $\text{O} \rightarrow \text{O}^{-1}$  and  $\text{O} \rightarrow \text{O}^{2-}$  as  $-141$  and  $702\text{kJmol}^{-1}$  respectively, how can you account for the formation of a large number of oxides having  $\text{O}^{2-}$  species and not  $\text{O}^{-}$ ?
20. Which of the aerosol is responsible for the depletion of ozone?
21. Describe the manufacture of  $\text{H}_2\text{SO}_4$  by contact process?
22. How does  $\text{SO}_2$  cause air pollution?
23. Halogens are strong oxidizing agents. Explain.
24. Fluorine forms only one oxoacid, HOF. Explain.
25. Oxygen and Chlorine has nearly the same electronegativity, still oxygen forms hydrogen bonds while chlorine does not. Why?
26. State two applications of  $\text{ClO}_2$ .
27. What is the reason for halogens being coloured?
28. Give the reactions of  $\text{Cl}_2$  and  $\text{F}_2$  with water.
29. Write the reactions involved in the preparations of HCl from  $\text{Cl}_2$  and  $\text{Cl}_2$  from HCl.
30. What was the inspiration for N. Bartlett to carry out the reaction between  $\text{PtF}_6$  and Xe?
31. In the compounds given below, find the oxidation states of phosphorus: (i)  $\text{H}_3\text{PO}_4$  (ii)  $\text{PCl}_5$  (iii)  $\text{Ca}_3\text{P}_2$  (iv)  $\text{NaPO}_4$  (v)  $\text{POF}_3$
32. Give balanced equations for the reactions below:
  - (a) NaCl being heated with  $\text{H}_2\text{SO}_4$  in the presence of  $\text{MnO}_2$ .
  - (b) Chlorine gas passed through a solution of NaI in water.
33. State the reaction that gives xenon fluorides  $\text{XeF}_2$ ,  $\text{XeF}_4$  and  $\text{XeF}_6$ .
34. Give the neutral molecule with which  $\text{ClO}^-$  isoelectronic. Is this molecule a Lewis base?
35. State the preparation reaction of  $\text{XeO}_3$  and  $\text{XeOF}_4$ .
36. Rearrange the given sets in the order as mentioned:
  - (1)  $\text{Cl}_2$ ,  $\text{F}_2$ ,  $\text{I}_2$ ,  $\text{Br}_2$  – increasing bond dissociation enthalpy.
  - (2) HCl, HI, HBr, HF – increasing acidic strength.
  - (3)  $\text{PH}_3$ ,  $\text{NH}_3$ ,  $\text{AsH}_3$ ,  $\text{BiH}_3$ ,  $\text{SbH}_3$  – increasing base strength.
37. Identify the one that does not exist, from among the following.
  - (a)  $\text{XeOF}_4$

- (b)  $\text{NeF}_2$   
 (c)  $\text{XeF}_2$   
 (d)  $\text{XeF}_6$
38. Present the structure and write the formula of a noble gas specie that is isostructural with:  
 ( a )  $\text{ICl}_4^-$   
 ( b )  $\text{IBr}_2^-$   
 ( c )  $\text{BrO}_3^-$
39. What is the reason for noble gases having relatively bigger atomic sizes?  
 40. Give some uses of argon and neon gases.  
 41. Why has it been difficult to study the chemistry of radon?  
 42. Balance the following equation:  $\text{XeF}_6 + \text{H}_2\text{O} \rightarrow \text{XeO}_2 \text{F}_2 + \text{HF}$   
 43. Why is helium used in diving apparatus?  
 44. Why is  $\text{ICl}$  more reactive than  $\text{I}_2$ ?  
 45. Name two poisonous gases which can be prepared from chlorine gas.  
 46. Give the reason for bleaching action of  $\text{Cl}_2$ ?  
 47. Sea is the greatest source of some halogens. Comment.  
 48. Give two examples to show the anomalous behaviour of fluorine.  
 49. Considering the parameters such as bond dissociation enthalpy, electron gain enthalpy and Hydration enthalpy, compare the oxidizing power of  $\text{F}_2$  and  $\text{Cl}_2$ .  
 50. Why is  $K_{a2} \ll K_{a1}$  for  $\text{H}_2\text{S}_4\text{O}$  in water?

## BIOLOGY

- Q1. Name the parts of an angiospermic flower in which development of male and female gametophyte take place.  
 Q2. Differentiate between hypocotyle and epicotyle.  
 Q3. Why apple called a false fruit?  
 Q4. Differentiate between zoospore and zygote.  
 Q5. Differentiate between external and internal fertilization.  
 Q6. How many eggs do you think were released by the ovary of a female dog which give birth to six puppies?  
 Q7. What are suggested reason for population explosion?  
 Q8. Name two autosomal genetic disorders and their symptoms.  
 Q9. Briefly explain contribution of T.H Morgan.  
 Q10. If the sequence of one strand in DNA is  
     5' ATGCATGCATGCATGCATGC 3'  
 a) Write down the complementary strand 5' → 3' direction.  
 b) Write the sequence of mRNA and tRNA  
 Q11. Difference between mRNA and tRNA  
 Q12. Briefly describe :  
 a) Transcription b) Translation c) Lac operon concept.  
 Q13. Differentiate between convergent and divergent evolution.

## COMPUTER SCIENCE

- Q1 How does C++ organize memory when a program is run?  
 Q2 Find out the errors in the following C++ statement  
 const int \*pc;

```
*pc=10;
(*pc)++;
```

- Q3. Is a pointer to a structure possible?
- Q4. What is meant by memory leak/bleeding?
- Q5. What do you understand by this pointer?
- Q6. Differentiate between uninitialized and a NULL pointer?
- Q7. What will be output of the following program?
- ```
void main()
{
char *ptr="abcd";
char ch;
ch=++*ptr++;
cout<<ch;
}
```
- Q8. What is the utility of having an array of pointers? Explain this concept with the help of a suitable example?
- Q1. How does a class accomplish data abstraction and encapsulation? Give Example of each.
- Q2. What do you understand by nested class? Give example.
- Q3. What is the significance of scope resolution operator::?
- Q4. Define static data members and functions.
- Q5. What is nested class? How the inner class definition does affects the objects? Give an example?
- Q6. What is the similarity and difference between an array and structure?
- Q7. Define inheritance, polymorphism, encapsulation, modularity?
- Q8. Write a function which takes one string argument and returns a reversed string.
- Q9. Compare the usefulness of default arguments and function overloading? Support your answer with the suitable examples.
- Q10. Write a program in C++ to pass an object and return the object. Make suitable assumptions.
- Q11. Declare a structure to represent a complex number (with real and imaginary part).Write a C++ program to add, subtract, multiply and divide two complex numbers.
- Q12. Declare a class myfolder with the following specifications;
- Private members of the class
- |            |   |                                       |
|------------|---|---------------------------------------|
| Filenames  | - | an array of strings of size a[10][25] |
| Availspace | - | long                                  |
| Usedspace  | - | long                                  |
- Public Member of the class**
- |                  |   |                                                                              |
|------------------|---|------------------------------------------------------------------------------|
| Newfileentry( )  | - | A function to accept values of Filenames,Availspace and USedspace from user. |
| Retavailspace( ) | - | A function that returns the value of total kilobytes available.              |
| Showfile( )      |   | a function that displays the names of all the files in myfolder.             |

Q1. (i) class basex

```
{
int x;
public:
void setx(int y)
{x=y;}
};

class derived:basex { };
```

What is the access level for the member function "setx" in the class "derived" above?  
(a) protected (b) private (c) local (d) public

- (ii) What is the difference between put() and write()?
- (iii) Distinguish between the two following statements:  
Time T1(13,10,25);  
Time T1==time (13,10,25);
- (iv) What do you mean by memory leak?
- (v). What is an abstract class?
- (vi). What is inheritance?

- Q2. (i) Can you perform arithmetic operations on pointers? Support your answer with the example.  
(ii) What is the problem with the following code fragment? Correct the error and write the output.

```
char buf[ ]="Hi There"
int main()
{
    char *ptr;
    for(int i=0;buf[i]!='\0';++i)
        ptr[i]=buf[i];
    cout<<ptr;
    return 0;
}
```

- (iii). How a pointer can point to a class object? Illustrate it with the help of an example?
- (iv). Discuss the two methods of opening a file in C++ program. When is one method preferred over the other?
- (v). Find out the error(s) if any.  
ifstream infile;  
infile.open ("dos.txt",ios::app);  
infile<<ch;
- (vii). Can you think of the benefits of a private class if any? What are they?
- (viii). How is a copy constructor related to a function returning an object?
- (ix). Identify the error(s) in the following code and correct the code, explaining every change being introduced:

```
#include<iostream.h>
class code
{ int no;
  char branch;
  static int count;
  code (int i=0,char b);
public:
  code(code A)
  { no=A.no;
    branch=A.branch;}
  }
  ~code( )
  { cout<<"Destroying object" <<- -count<<"\n";
  };
code(int l,char b)
{ no=l;
  branch=b;
}
int main( )
{code X,Y;
.
```

```
return 0;}
```

- (x). How does a class accomplish data abstraction and encapsulation?
  - (xi). What do you understand by nested class? Give example.
  - (xii). What is the significance of scope resolution operator ::?
  - (xiii). Define static data members and functions.
  - (xiv). Discuss how the best match is found when a call to an overloaded function is made? Give examples.
  - (xv). What is nested structure? Give an example?
- Q20. What is the similarity and difference between an array and structure?
- Q21. Write a function which takes one string argument and returns a reversed string.
- Q22. When do ambiguities arise in multiple inheritances? How can one resolve it?
- Q23. What do you understand by constructor and destructor functions used in classes? How are these functions different from other member functions?
- Q25. Compare the usefulness of default arguments and function overloading? Support your answer with the suitable examples.
- Q27. Define a class **DONOR** with the following specification:

**Private:**

Doner number integer  
Name 20 characters  
Blood group 2 characters

**Public:**

Input( ) A function to accept all the information  
Output( ) A function to display all the information  
Checkgroup( ) A function with char\* return type to return Blood group

- Q28. Consider the following declaration and answer the questions given below:

```
class NATION
{
int H;
protected:
int S;
public:
void INPUT(int);
void OUTPUT( );
};
class WORLD:private NATION
{ int T;
protected:
int U;
public:
void INDATA(int,int);
void OUTDATA( );
};
class STATE:public WORLD
{ int M;
public:
void DISPLAY(void);
};
```

- (i) Name the base class and derived class of the class WORLD.
- (ii) Name the data member(s) that can be accessed from function DISPLAY().
- (iii) Name the member function that can be accessed from the object of class STATE.
- (iv) Is the member function OUTPUT( ) accessible by all the objects of class WORLD.
- (v) Which type of inheritance does this exhibit?