

**ST. FRANCIS XAVIER SCHOOL**  
**Academic year – 2022-2023**  
**Class – XI Science**  
**PRACTICE PAPER**

**Instructions:**

- 1. Maximum marks for each of the subjects is 40 marks**
- 2. Time allowed for each subject is 1 hr 30 min.**
- 3. Answers should be written in the respective subject test copies.**

**ENGLISH**

Q1. Write a composition (450-500 words) Competition is necessary for success. Discuss [10]

Q2. Critically analyse the short story "Salvatore" [5]

Q3. Read the extract given below and answer the questions that follow:

Boatswain : .....A plague upon this howling .

They are louder than the weather or our office

a) Who all are howling ? Why? Where are they ? [2]

b) Why is the Boatswain angry with them ? What does he ask them to do? [2]

c) Bring out the meaning of i) plague ii) our office. [1]

Q4. Bring out the significance of the conversation between Gonzalo and the Boatswain.(based on Act 1 Sc 1 till the portion taught) [5]

Q5. How did Salvatore spend his days before joining the Navy ? [5]

Q6. Salvatore played the role of an ideal husband and an ideal father in the later part of the story- Justify.

Q7. Transformation of Sentences [5]

1. A: Among his paintings, the most striking was the portrait of an old woman in the grip of poverty.

B: None .....

2. A: I would do anything in the world to make my mother happy.

B: There's.....

3. A: Though Dinesh insulted him, Vikas was silent.

B: Not a.....

4. A: Rohan was so terrified of being left alone in the house that he started screaming.

B: So.....

5. A: I watch T.V. everyday.

B: Hardly...

Question 8. Fill in the blanks with appropriate words. [5]

1. We took our new neighbour \_\_\_\_ a spy.

2. Don't sit \_\_\_\_ and waste your time.

3. Please look \_\_\_\_ the word in the dictionary.

4. He impressed \_\_\_\_ the students, the value of discipline.

5. The rich man fell \_\_\_\_ thieves and he was left for dead.

**MATHEMATICS**

Q1 a) Show  $8^{n+1} - 7n - 8$  is divisible by 49 using Binomial theorem. [2]

b) Find the number of ways of selection of 4 letters that can be made using the letters of the word "EXPRESSION". [2]

Q2. a) If a real valued function  $f(x) = \frac{x^2+x+2}{x^2+x+1}$ , find it's domain and range. [4]

b) The probability that a student will pass the final exam in both Maths and Physics is 0.5 and the probability of passing neither is 0.1. If the probability of passing in Physics is 0.75, what is the probability of passing the Maths examination? [4]

Q3. Using Mathematical Induction, prove:  $3^{4n-2} + 5^{2n-1}$  is a multiple of 14,  $n \in \mathbb{N}$ . [4]

Q4. Find the equation of the circle passing through the points (2,3), (-1,1) and centre lying on  $x-3y-11=0$ . [4]

Q5. In an examination, a question paper consists of 12 questions divided into 2 parts – I, II, containing 5 & 7 questions respectively. A student is required to attempt 8 questions in all, selecting at least 3 from each part. In how many ways can a student select the questions? [4]

Q6. i) Evaluate:  $\lim_{x \rightarrow 7} \frac{4 - \sqrt{9+x}}{1 - \sqrt{8-x}}$

ii) Differentiate  $\sin(2x+3)$  with respect to  $x$  principle. [2+2=4]

Q7. a) Solve graphically:  $-x + 2y \leq 8$ ,  $2x - y \geq -4$ ,  $y \leq 8$ . [6]

b) Calculate mean and standard deviation: [6]

Class	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45
Frequency	2	2	2	7	12	6	3	3	3

### PHYSICS Section – A

Question 1: [5×1=5]

- (i) Two particles of masses  $m_1$  and  $m_2$ , approach each other due to their mutual gravitational attraction only. Then
- accelerations of both the particles are equal.
  - acceleration of the particle of mass  $m_1$  is proportional to  $m_1$ .
  - acceleration of the particle of mass  $m_1$  is proportional to  $m_2$ .
  - acceleration of the particle of mass  $m_1$  is inversely proportional to  $m_1$ .
- (ii) If the ratio of mean distances of three planets from the sun are 0.5 : 1 : 1.5, then find the square of time periods in the ratio.
- 1 : 8 : 27
  - 1 : 27 : 8
  - 8 : 27 : 1
  - 27 : 8 : 1
- (a) For a satellite moving in an orbit around the earth, the ratio of its potential energy to kinetic energy is
- 1
  - 2
  - 2
- (iii) A solid sphere falls with a terminal velocity  $v$  in air. If it is allowed to fall in vacuum,
- terminal velocity of sphere =  $v$
  - terminal velocity of sphere <  $v$
  - terminal velocity of sphere >  $v$
  - sphere never attains terminal velocity.
- (iv) The temperature of a wire is doubled. The Young's modulus of elasticity will
- also doubled
  - remains same
  - become four times
  - decreases.

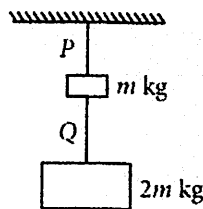
Question 2: [5×1=5]

- (i) Find the velocity of efflux of water from an orifice near the bottom of a tank in which pressure is 500  $\text{gf cm}^{-2}$  above atmosphere.
- (ii) An artificial satellite moving in a circular orbit around the Earth has a total energy  $E_0$ . What is its potential energy?

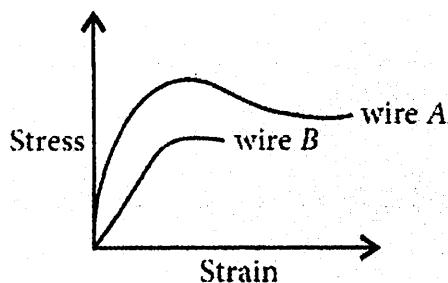
- (iii) The ratio stress/strain remains constant for small deformation. What will be the effect on this ratio when the deformation made is very large?
- (iv) How soap detergent can help to clean the cloths.
- (v) What is the Young's modulus for a perfect rigid body?

### Section – B

3. The breaking force for a wire is  $F$ . What will be the breaking force for (a) two parallel wires of the same size (b) a single wire of double the thickness? [2]
4. Bernoulli's theorem holds for incompressible, non-viscous fluids. How this relationship changed when the viscosity of fluid is not negligible? [2]
5. 8 Two mercury droplets of radii 0.1 cm. and 0.2 cm. collapse into one single drop. What amount of energy is released? The surface tension of mercury  $T = 435.5 \times 10^{-3} \text{ N m}^{-1}$ . [2]
6. Two identical heavy spheres are separated by a distance 10 times their radius. Will an object placed at the mid-point of the line joining their centres be in stable equilibrium or unstable equilibrium? Give reason for your answer. [2]
7. Two wires P and Q of same diameter are loaded as shown in the figure. The length of wire P is  $L$  m and its Young's modulus is  $Y \text{ N m}^{-2}$ , while length of wire Q is twice that of P and its material has Young's modulus half that of P. Compute the ratio of their elongation. [2]



8. A satellite is to be placed in equatorial geostationary orbit around earth for communication. (a) Calculate height of such a satellite. (b) Find out the minimum number of satellites that are needed to cover entire earth so that at least one satellites is visible from any point on the equator. [ $M = 6 \times 10^{24} \text{ kg}$ ,  $R = 6400 \text{ km}$ ,  $T = 24\text{h}$ ,  $G = 6.67 \times 10^{-11} \text{ SI units}$ ] [3]
9. A hot air balloon is a sphere of radius 8 m. The air inside is at a temperature of  $60^\circ\text{C}$ . How large a mass can the balloon lift when the outside temperature is  $20^\circ\text{C}$ ? (Assume air is an ideal gas,  $R = 8.314 \text{ J mole}^{-1}\text{K}^{-1}$ ,  $1 \text{ atm.} = 1.013 \times 10^5 \text{ Pa}$ ; the membrane tension is  $5 \text{ N m}^{-1}$ .) [3]
10. Derive an expression for the elastic potential energy stored in a stretched wire under stress.
11. (a) What is the weight of a body at a distance  $2r$  from the centre of the earth if the gravitational potential energy of the body at a distance  $r$  from the centre of the earth is  $U$ ? [3]  
 (b) When escape velocity is given to a particle on the surface of earth, what will be its total energy?
11. Water at a pressure of  $4 \times 10^4 \text{ N m}^{-2}$  flows at a speed of  $2 \text{ m s}^{-1}$  through a horizontal pipe of cross-sectional area  $0.02 \text{ m}^2$ . The cross-sectional area is reduced to  $0.01 \text{ m}^2$ . What is the pressure in the smaller cross-section of the pipe? [3]
12. Stress-strain curve for two wires of material A and B are as shown in figure. (a) Which material is more ductile? (b) Which material has greater value of Young's modulus? (c) Which of the two is a stronger material?



13.

- (a) State Stoke's law for viscous drag experienced by the spherical body falling through a viscous liquid.
- (b) Why does a spherical body achieve terminal speed?
- (c) On what factors does the terminal speed depend?
- (d) Consider two solid spheres P and Q each of density  $8 \text{ g/cm}^3$  and diameters 1 cm and 0.5 cm, respectively. Sphere P is dropped into a liquid of density  $0.8 \text{ g/cm}^3$  and viscosity  $\eta=3$  poiseulles. Sphere Q is dropped into a liquid of density  $1.6 \text{ g/cm}^3$  and viscosity  $\eta=2$  poiseulles. Find the ratio of the terminal velocities of P and Q.

[3]

### CHEMISTRY

Question 1

a. Which represent the correct IUPAC of the following

i. 2,2dimethylpentane or 2dimethylpentane.

ii. But-3-yn-1-ol or But-4-ol-1-yne.

Question 2

a. 3-Bromo-pentane and propan-2-ol are both optically active, explain .

Or

Why is meso tartaric acid optically inactive ?

Question 3

Give reason why;

i. The dipole moment of  $\text{BF}_3$  is zero whereas  $\text{NH}_3$  is 1.49D.

ii. The dipole moment of cis and trans dichlorobutane is different.

iii. The boiling point of para-nitrophenol is higher ortho-nitrophenol.

iv. Water is a bent molecule and ammonia is pyramidal.

Question 4

i. Trichloroacetic acid is more acidic than chloroacetic acid .Why?

ii. Acetaldehyde reacts with HCN, state the mechanism.

iii. Phenols are ortho and para orienting. Why?

Question 5

i. What is the fundamental difference between Rutherford and Bohr's model?

ii. Show that the circumference of Bohr orbit for the hydrogen atom is an integral multiple of the De Broglie wavelength.

Question 6

a. Write the structure of

i) Pent-4-en-2-ol

ii) 3-Chloro-2-methylbutanoic acid

b. Draw the isomers of  $\text{C}_3\text{H}_6\text{O}$ . State the type of isomerism.

Question 7

Calculate the energy of the photon of light having frequency of  $3.0 \times 10^{15} \text{ s}^{-1}$ .

Why there are no possibilities of 2d and 3f orbitals?

A 200 watt bulb emits electro-magnetic light of wavelength 400 nm. Calculate the number of photons emitted per second by the bulb.

Question 8

i. Give reason why

[4]

[4]

[2]

[4]

[4]

[4]

[4]

[4]

[4]

Electron gain enthalpy of fluorine is less than that of fluorine.

The size of cation is small than that of neutral atom.

I.E of nitrogen is greater than that of Carbon.

ii. Define periodicity. Write the name the element with the atomic number 109.

The radius of Cl and Cl<sup>-</sup> is different. Comment upon

Question 8

[4]

i. Using s, p and d notations, describe the orbitals with the following quantum numbers:

a. n=1, l=0; b. n=3, l=1

ii. Helium has two electrons, the first electron occupies the orbital, but keeping in mind the Pauli's Exclusion Principle how can the second electron also occupy the same orbital to satisfy the Hund's Rule?

Question 9

[4]

i. What is electromeric effect? Explain with equations.

ii. Classify the following reaction, also draw the energy profile diagram.

a. Methyl chloride when treated with aqueous KOH.

b. Tertiary butyl chloride when treated with aqueous KOH.

Question 10

[4]

i. What is the structure of SiO<sub>4</sub><sup>4-</sup> OR SF<sub>6</sub>.

ii. Boiling point of water > hydrogen fluoride > ammonia. Why?

iii. Compare the bond order and magnetic character of superoxide and peroxide ion.

## BIOLOGY

Question 1: Give a graphic outline of life cycle of bryophytes.

[3]

Question 2: State the characteristic features of the phylum platyhelminthes.

[3]

Question 3: Fill in the blanks:

[5]

Question 4: State the functions of cortex and pericycle.

[2]

Sl. No.	Type of modification	Function	Example
1	Tendrils	-----	-----
2	Spine	-----	-----
3	Bulb	-----	-----
4	Insect trap	-----	-----
5	Leaf-bud	-----	-----

Question 5: State the differences between monocot and dicot leaf.

[4]

Question 6: Fill in the table:

[4]

Blood groups	Antigens	Antibodies	Can give blood to	Can receive blood from
AB	-----	-----	-----	-----
A	-----	-----	-----	-----
B	-----	-----	-----	-----
O	-----	-----	-----	-----

Question 7: Define the terms: Matric potential, Solute potential and Pressure potential. Give the equation representing the interrelationship between them.

[3]

Question 8: State the features of the leaves showing Kranz Anatomy.

[3]

Question 9: Draw a well labeled diagram of T.S of alimentary canal.

[2]

Question 10: Write a short note on hepatic portal system.

[3]

Question 11: State the functions of: i) glomerulus ii) Bowman's capsule iii) proximal convoluted tubule iv) loop of Henle v) distal convoluted tubule vi) collecting duct.

[6]

Question 12: Draw a well labeled diagram of a stomatal apparatus.

[2]

## COMPUTER SCIENCE

### Question 1

[10]

Write a program in JAVA to enter binary equivalent of two different decimal numbers in two different single dimensional arrays and count the hemming distance. Assume that both the binary digits have the same length.

[ Hemming distance is defined as the comparison of binary digits of decimal numbers (base 10) from the same location. If both the digits are same then 'Hemming distance'=0 otherwise 1.]

1	1	0	0	1	0	0	1	1
	↑↓	↑↓		↑↓	↑↓		↑↓	
1	0	1	0	0	1	0	0	1

[Here the Hemming distance = 5]

Also display the decimal equivalent of these binary numbers.

Sample data:

INPUT : first decimal number = 110010011  
second decimal number = 101001001

OUTPUT : Hemming distance = 5  
Decimal equivalent of first number = 403  
Decimal equivalent of second number = 329

### Question 2

[10]

A sentence in the Special Fashion can be printed by taking two integers (not beyond total number of words

in the sentence or less than 1). These integers tell the word number of the sentence. Replace only those words present at those given integer places by the next character in a circular fashion according to the English Alphabets. If both the integers are same then replace only one word.

Let us consider the following examples:

Input Sentence: He has good Books.

Input Integers: 2, 4

Output Sentence: He ibt good Cpplt.

(i.e. word number 2 and 4 have been replaced by the next characters in a circular fashion)

Input Sentence: Time and tide waits for none.

Input Integers: 3, 3

Output Sentence: Time and ujef waits for none.

Write a case sensitive program that reads a sentence from console (the characters of the sentence may be capital or small or mixed) and two positive integers and output the same sentence after replacing those words present at those given integer places by the next character in a circular fashion according to the English Alphabets. In the first example given above, word number 2, i.e. "has" is replaced by next characters and so it

becomes "ibt". Similarly, word number 4, i.e. "Books" is replaced by next character and it becomes "Cpplt"

### Question 3

[5]

The following functions are part of some class:

```
void fun1(char s[ ],int x)
{ System.out.println(s);
  char temp;
  if(x<s.length/2)
  { temp=s[x];
    s[x]=s[s.length-x-1];
```

```

s[s.length-x-1]=temp;
fun1(s,x+1);
}}
void fun2(String n)
{ char c[ ]=new char[n.length( )];
for(int i=0;i<c.length; i++)
c[i]=n.charAt(i);
fun1(c,0);
}

```

- (i) What will be the output of fun1( ) when the value of s[ ]={'J','U','N','E'} and x=1? [2]  
(ii) What will be the output of fun2( ) when the value of n ="SCROLL" ? [2]  
(iii) State in one line what does the function fun1( ) do apart from recursion. [1]

#### Question 4

[5]

The following function Rec( ) is a part of some class. What will be the output of Rec( ) when the value of n is equal to 10. Show the dry run/working.

```

public void Rec(int n)
{
if(n>1)
{
System.out.print(n+" ");
if(n%2!=0)
{
n=3*n+1;
System.out.print(n+" ");
}
}
Rec(n/2);
}}

```

#### Question 5

[10]

Given are the details-

Class Name : Point

Member Data :

x ( x coordinate)

y ( y coordinate )

Member Function :

Constructors : Default and Parameterized

void display() : display a point

double findDistance( Point ) : inputs a point as parameter and returns distance between current object and parameterized object them.

Point findMidPoint( Point ) : returns midpoint between current object and parameterized object.

Now write a main method that accepts two point and calculate its midpoint and distance between them with the help of above method

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