ST. FRANCIS XAVIER SCHOOL
Academic year – 2022-2023
Class – XII 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 short paragraph on any one of the following: [5]
1 "Greed for wealth and power is the chief villain of our woes." Argue for or against the proposition.
2.Uneasy lies the head that wears a crown.' Narrate a personal experience, which brings out the truth of the saying.

Q2.) Rewrite as directed: [5]
1. Sunita confessed that she had been very stupid. Begin: Sunita said, "..........................."
2. The stranger inquired of me if I knew their way. Begin: He said to me," ....
3. He bade good-bye to his friends. Begin: He said," ....
4. Jeetesh said, "The traffic prevented me from coming to this place." Begin: Jeetesh said that ....
5. The teacher said to the students, "I shall prove now that the earth moves round the sun. " Begin: The teacher told the boys ....

Q3. Fill in with the correct phrasal verbs: [5]
1. The truth finally _____ me. (dawned on/dawned about)

2. He _____ as if nothing had happened. (carried on, carried through) 3. He _____ all struggle. (gave up / gave out)
4. _____ the light, please. (Switch on, switch for)
5. She _____ her mother. (takes in, takes after)

Q4. In B. Wordsworth by V. S. Naipaul we have the theme of admiration, identity, curiosity, friendship, control, freedom, uncertainty and coming of age. Give examples from the story bringing out these themes. [5]

Q5. Why was the Masque scene arranged ? How did Prospero warn Fedinand just before the Masque scene ? [5]

Q6 [5]
Where will Ceres descend and according to Iris what will Ceres leave before descending ?

Q7. [5]
State how Thomas Hardy brings out the image of 'death' through the description of landscape in the poem ' The Darkling Thrush'.

Q8. [5]
Describe the 'thrush' in the poem' The Darkling Thrush' . What were the feelings of the poet on hearing the song of the 'thrush'?

MATHEMATICS

Q1. a) If $y = \frac{\cos x - \sin x}{\cos x + \sin x}$, prove $\frac{dy}{dx} = -(1+y^2)$ [2]

b) Find the slope of the normal to the curve x= a $\sin^3 t$, y = b $\cos^3 t$ at t = $\frac{\pi}{2}$ [2]

Q2. If f : [-1,1] → R, be a function as $f(x) = \frac{x}{x+2}$, is f(x) one-one and onto ? [2]

Q3. If y = $\sin^{-1} x + \sin^{-1}\sqrt{1-x^2}$, find $\frac{dy}{dx}$. [2]

Q4.a) Evaluate : $\int_0^{\frac{\pi}{2}} \log \cot x \, dx$ [2]

b) Evaluate : $\int_{\frac{\pi}{5}}^{\frac{3\pi}{10}} \frac{dx}{\tan^7 x + 1}$ [2]

Q5. Solve : $(x+y+1)\frac{dy}{dx} = 1$ [2]

Q6. Solve for x : $\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1}\frac{8}{31}$ [4]

Q7. If bag A contains **2 red, 3 white** balls, bag B contains **2 white, 3 black** balls and another bag C contains **2 black, 3 red** balls ; a bag and a ball out of it are selected at random. What is the probability that the selected ball is white, assuming selections of bag A,B,C are equally likely ? [4]

Q8. a) Evaluate : $\int x^2 \tan^{-1} x \, dx$ [4]

b) Evaluate : $\int_0^{\frac{\pi}{2}} \frac{x \sin x \cos x \, dx}{\sin^4 x + \cos^4 x}$ [4]

Q9. Find the derivative of $\tan^{-1}\frac{\sqrt{1+x^2}-1}{x}$ with respect to $\tan^{-1}\frac{2x\sqrt{1-x^2}}{1-2x^2}$ at x=0. [4]

Q10. Solve by matrix inversion method (Martin's Rule) :
9x+7y+3z=6, 5x-y+4z=1, 6x+8y+2z=4. [6]

PHYSICS

Section – A (10 marks)   [10×1=10]

1. Which of the following statements is correct?
(a) The induced e.m.f is not in the direction opposing the change in magnetic flux so as to oppose the cause which produces it.
(b) The relative motion between the coil and magnet produces change in magnetic flux.
(c) Emf is induced only if the magnet is moved towards coil.
(d) Emf is induced only if the coil is moved towards magnet.

2. How will the self-inductance L of a solenoid change, if number of turns N increases, length L decreases and cross section A increases ? (a) Increases (b) Decreases (c) Does not change (d) None of these

3. Two waves having the intensities in the ratio of 9 : 1 produce interference. The ratio of maximum to minimum intensity is (a) 10 : 8   (b) 9 : 1   (c) 4 : 1   (d) 2 : 1

4. In a Young's double slit experiment, the source is white light. One of the holes is covered by a red filter and another by a blue filter. In this case
(a) there shall be alternate interference patterns of red and blue.
(b) there shall be an interference pattern for red distinct from that for blue.
(c) there shall be no interference fringes.
(d) there shall be an interference pattern for red mixing with one for blue.

5. In Young's double-slit experiment, the distance between the slit sources and the screen is 1 m. If the distance between the slits is 2 mm and the wavelength of light used is 600 nm, the fringe width is
(a) 3 mm   (b) 0.3 mm   (c) 6 mm   (d) 0.6 mm

6. Why are coherent sources required to create interference of light?

7. What will be the effect on interference fringes if red light is replaced by blue light?

8. No interference pattern is detected when two coherent sources are infinitely close to each other. Why?

9. The emf of a cell is always greater than its terminal voltage. Why? Give reason.

10. Define the term 'Mobility' of charge carries in a conductor. Write its SI unit.

Section – B (3 marks)   [3×1=3]

11. When a current I flow through a coil, flux linked with it is $\varphi = LI$, where L is a constant known as self-inductance of the coil. Any change in current sets up an induced emf in the coil. Thus, self-inductance of a coil is the induced emf set up in it when the current passing through it changes at the unit rate. It is a measure of the opposition to the growth or the decay of current flowing through the

coil. Also, value of self-inductance depends on the number of turns in the solenoid, its area of cross-section and the relative permeability of its core material.
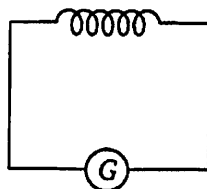

(i)   A current of 2.5 A flows through a coil of inductance 5 H. What is the magnetic flux linked with the coil?

(ii) What is the unit of self-inductance?

(iii) Deduce the relation for which the inductance L of a solenoid depends upon its radius R.

Section – C (8 marks)

12. Plot a graph showing variation of voltage Vs the current drawn from the cell. How can one get information from this plot about the emf of the cell and its internal resistance?   [2]
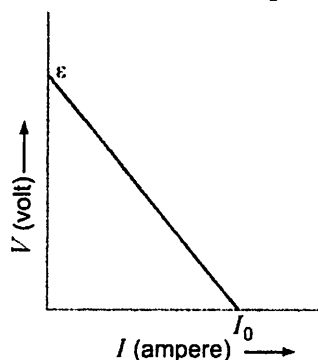
13. Use Kirchhoff's laws to determine the value of current I1 in the given electrical circuit   [2]
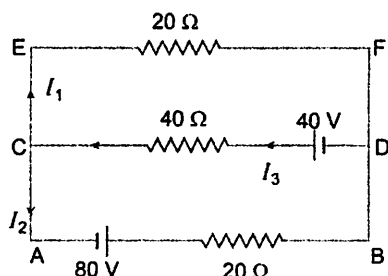

14. In the circuit shown in the figure, find the total resistance of the circuit and the current in the arm CD.


[2]
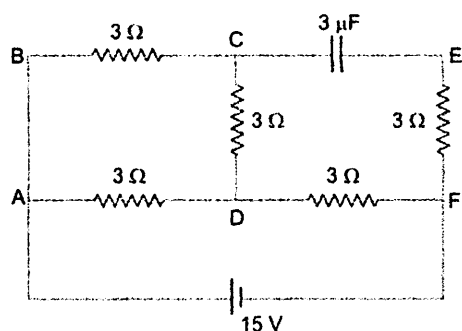
15. In a potentiometer arrangement for determining the emf of a cell, the balance point of the cell in open circuit is 350 cm. When a resistance of 9 Ω is used in the external circuit of the cell, the balance point shifts to 300 cm. Determine the internal resistance of the cell.   [2]

Section – D (9 marks)

16. A device 'X' is connected to an ac source $V = V_0 \sin \omega t$. The variation of voltage, current and power in one cycle is shown in the following graph:
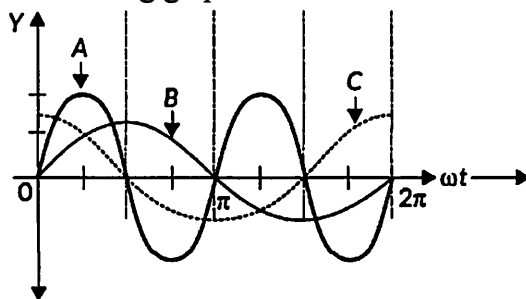
(a) Identify the device 'X'.
(b) Which of the curves A, B and C represent the voltage, current and the power consumed in the circuit? Justify your answer.
(c) How does its impedance vary with frequency of the ac source? Show graphically.   [3]

17. Draw the intensity distribution for (i) the fringes produced in interference, and (ii) the diffraction bands produced due to single slit. Write two points of difference between the phenomena of interference and diffraction.   [3]

18. The intensity at the central maxima (O) in a Young's double slit experiment is I0. If the distance OP equals one-third of the fringe width of the pattern, show that the intensity at point P would be.   [3]
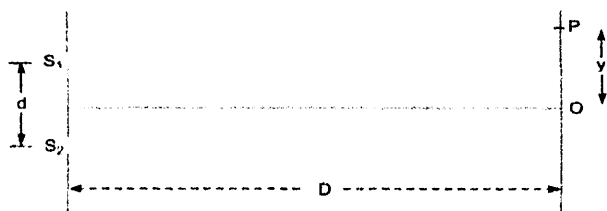
Section – E(10 marks)

19.

(a) The instantaneous value of an alternating voltage in volts is given by the expression $\varepsilon_t = 140 \sin 300\ t$, where $\not{c}$ is in second. What is the

(i)   peak value of the voltage
(ii)   rms value and
(iii) frequency of the supply?

(b) Alternating emf $\varepsilon = 220 \sin (100\ \pi t)$ is applied to a circuit containing an inductance of $1/\pi$ H. Write an expression for instantaneous current through the circuit?   [3+2=5]

(a) Use Huygens' principle to show how a plane wavefront propagates from a denser to rarer medium. Hence, verify Snell's law of refraction.   [5]

CHEMISTRY

Question 1   [4]
(i)   Transition elements are coloured ones and they exihibit paramagnetic behaviour,explain
(ii)   Except Zn, Cd, Hg the enthalpy of atomization is low for other transition elements,why?
(iii) Name four bases present in DNA

Question 2   [4]
State the reagents for the following reactions also name the reactions:

(a)   Nitrobenzene ------A---→ Aniline------------------B -----→Chlorobenzene

Give reasons for the following

(b)   Methylamine is more basic than aniline.

(c)   Methylamine and dimethylamine reacts differently with choroform and alcoholic potassium hydroxide.

Question 3 [4]

Write the reactions involved in the following reactions:

i. Clemmensen Reaction   ii. Cannizaro reaction iii. HVZ reaction   iv. Gatterman reaction

Question 4 [4]

A reaction is of second order with respect to a reactant. How is the rate of reaction affected ,if the concentration of the reactant is i. Doubled ii. reduced to half ?

A first order reaction has a rate constant $1.15 \times 10^{-3} s^{-}$. How long will 5g of this reactant take to reduce to 3 g?

Question 5 [4]

The cell in which the following reaction occurs :

$2Fe^{3+}$ (aq) $+2I^{-}$ (aq) -----$\rightarrow$ $2Fe^{2+}$ (aq)+ I_2 has E^0_{cell} = 0.236V at 298 K .Calculate the standard Gibbs energy and the equilibrium constant of the cell reaction.

Question 6 [4]

Give reasons for the following

a. Elevation of boiling of 1M KCl solution is nearly double than that of 1M sugar solution.

b. Sprinkling of salt help in clearing snow covered roads in hilly areas.

c. Give the equation of Reimer Tiemann reaction.

Question 7 [4]

Calculate the vapour pressure of an aqueous solution containing 5% by mass of urea at 298K .The vapour pressure of water at298K is 23.75mmHg.

Question 8 [4]

The molal freezing point depression constant of benzene is 4.90 Kkgmol^{-}.When 3.26g of Selenium is dissolved in 226 g of benzene the observed freezing point is 0.112^0C lower than pure Benzene ,Deduce the molecular formula of Selenium (Se_x, Se=78.8 amu)

Question9 [4]
(a)Calculate the e.m.f of the cell at 25^0 C
        Fe/Fe^{2+}(0.1M)//Ag+(0.1M)/Ag $E^0_{Fe^{2+}/Fe}$ = -0.44V $E^0_{Ag^+/Ag}$= 0.80V
        Why does the conductivity of a solution decrease with dilution?

(b) A conductivity cell when filled with 0-01 M KCL has a resistance of 747.5Ω at 25^0C . When the same cell was filled with an aqueous solution of 0.05 M $CaCl_2$ solution the resistance was 876Ω.Calculate
i. Conductivity of solution
ii Molar Conductivity .[Conducivity of 0.01 M KCl= 0.14114Sm^{-1}]

Question 10 [4]

Convert Acetaldehyde to crotonaldehyde.
Aliphatic aldehydes, aromatic aldehydes and ketones differ in reactivity?
Benzaldehyde, formaldehyde and acetaldehyde differs in reaction with NaOH, explain.

BIOLOGY

Question 1: What is the function of two male gametes produced by each pollen grain in angiosperms? [2]

Question 2: Draw a well labeled diagram of an embryo sac in angiosperms. [2]

Question 3: Draw a well labeled diagram of pBR322. [2]

Question 4: Write short notes on i) Founder effect ii) Bottleneck effect [3]

Question 5: Name two special types of lymphocytes in humans. How do they differ in their roles in immune response. [3]

Question 6: Fill in the table: [4]

	Expand	Definition
ICSI		
ZIFT		
GIFT		
AI		

Question 7: Work out Mendel's dihybrid cross till F_2 generation, using a punnet square. [2]

Question 8: Write the genotype and phenotype of the autosomal and sex chromosomal syndromes in the table given below: [3]

Syndrome	Genotype	Phenotype
Down's Syndrome		
Turner's Syndrome		
Klinefelter'sSyndrome		

Question 9: Write the steps involved in rDNA technology. [5]

Question10: State the applications of DNA fingerprinting. [3]

Question11: Ravi suffered from measles at the age of 10yrs. There are rare chances of him getting infected with the same disease in future. Give reason for the statement. [2]

Question12: What are interferons? State their function. Also name the type of immunity they provide [3]

Question 13: Explain the mechanism of PCR. [3]

Question 14: How was insulin obtained before the advent of rDNA technology? What were the problems encountered? [3]

COMPUTER SCIENCE

Question 1 [5]

The following is a function of some class. It computes x raised to power n. Here x is the base value and n is the power. There are five places in the code marked by ?1?, ?2?, ?3?, ?4?, ?5? that must be replaced by expression or statements so that program runs correctly.

```
double Power ( double x, int n)
{ int inverse n = 0;
  double result=1.0;
  if( n = = 0)
   return ?1?;
  else if ( n < 0 )
  { inverse = 1;
    n= ?2? ;
  }
  for( int i =1; ?3? ; i++)
  result ?4? x;
  if(inverse = = 1)
  result=?5?;
  return result;
}
```

i) What is the value at ?1?

ii) What is the value at ?2?

iii) What is the value at ?3?

iv) What is the value at ?4?

v) What is the value at ?5?

Question 2 [5]

The following function fun( ) is a part of some class. What will be the output of the function fun( ) when the value of n is "FEATURE" and the value of p is 5. Show the dry run/ working:

```
class Trial
{
public void fun(String n, int p)
{
   if(p<0)
   System.out.println(" ");
   else
{
   System.out.println(n.charAt(p)+".");
   fun(n,p-1);
   System.out.print(n.charAt(p));
 }
}
}
```

Question 3 [10]

The principal of a school intends to select students for admission to Class XI on the following criteria:

• Student is of the same school and has passed the Class X Board Examination with more than 60% marks.

OR

• Student is of the same school, has passed the Class X Board Examination with less than 60% marks but has taken active part in co-curricular activities.

OR

• Student is not from the same school but has either passed the Class X board Examination with

more than 60% marks or has participated in Sports at the national level.

The inputs are :

INPUTS

S - Student is of the same school

P - Has passed the Class X Board Examination with more than 60% marks.

C - Has taken active part in co-curricular activities.

T - Has participated in sports at the National Level.

OUTPUT :-

X – Denotes admission status [1 indicates granted and 0 indicates refused in all the cases.]

Draw the truth table for the inputs and outputs given above and write the SOP expression.

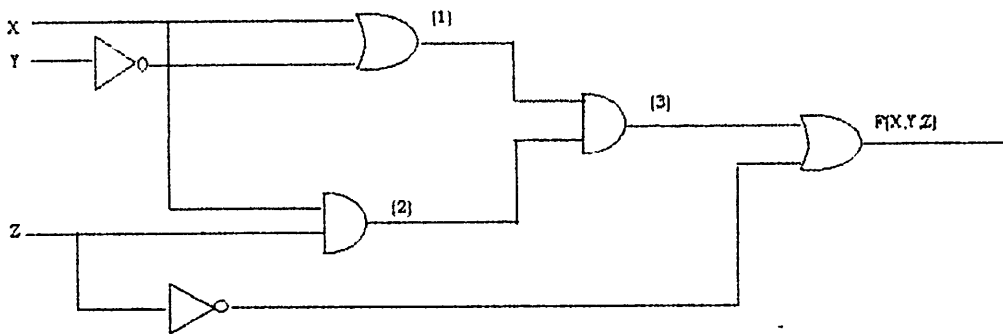a) Draw the truth table for the inputs and outputs given above and write the SOP expression.   [5]

b) Reduce X(S,P,C,T) using Karnaugh's map.

Draw the logic gate diagram for the reduced SOP expression for X(S,P,C,T) using AND and OR gate. You may use gates with two or more inputs. Assume that the variable and their complements are available as inputs.   [5]

Question 4   [10]

a) Verify algebraically $X'Y'Z' + X'Y'Z + X'YZ + X'YZ' + XY'Z' + XY'Z = X' + Y'$ [2]

b) From the following the diagram, name the outputs (1), (2) and (3). Finally derive the Boolean expression and simplify it to show that it represents a logic gate. Name and draw the logic gate. [4]

c) Consider the following truth table where A and B are two inputs and X is the output:

A	B	X
0	0	0
0	1	1
1	0	1
1	1	0

i) Name and draw the logic gate for the given truth table.   [2]

ii) Write the SOP and POS of X(A,B)   [2]

Question 4   [10]

Write a Program in Java to input a number and check whether it is a Keith Number or not.

[Note:A Keith Number is an integer N with 'd' digits with the following property:

If a Fibonacci-like sequence (in which each term in the sequence is the sum of the 'd' previous terms) is formed, with the first 'd' terms being the decimal digits of the number N, then N itself occurs as a term in

.the sequence.]
For example, 197 is a Keith number since it generates the sequence
1, 9, 7, 17, 33, 57, 107, 197, ...
Some Keith numbers are: 14 ,19, 28 , 47 , 61, 75, 197, 742, 1104, 1537...............

<u>Output:</u>
Enter the number : 197
The number is a Keith Number

Enter the number : 14
The number is a Keith Number

Enter the number : 53
The number is a not a Keith Number

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