

Sukuna Secondary School.

(Sundarharaicha-10, Morang)

First Terminal Examination-2081

Class-XII(Science)

F.M.- 37.5

Sub- Chemistry

Time-1.5 Hrs

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions

Group-A

1x5=5

Rewrite the correct options of each questions in your answer sheet.

1. Functional isomer of methoxyethane is

a. Propanal

b. Propanone

c. Propanoic acid

d. Propanol

2. The unit of rate constant for first order reaction is

a. $\text{mol L}^{-1}\text{s}^{-1}$

b. $\text{L mol}^{-1}\text{s}^{-1}$

c. s^{-1}

d. $\text{L s}^{-1}\text{mol}^{-1}$

3. The best reagent for the preparation of pure ethyl chloride from ethanol is

a. PCl_3

b. PCl_5

c. SOCl_2

d. Lucas reagent

4. Alcohol vapour can be dehydrated by passing over heated

a. Al_2O_3

b. CaO

c. CaCl_2

d. Ca(OH)_2

5. Mixture of methyl magnesium bromide and carbon dioxide gives

a. CH_3CHO

b. HCOOH

c. HCHO

d. CH_3COOH

Group 'B'

Short answer questions.

[5 x 5 = 25]

1. Chlorinated compound 'A' which react with conc HNO_3 to give tear gas.

a. Identify 'A' and how can you prepare 'A' by using one of the isomer of $\text{C}_2\text{H}_5\text{O}$?

[2]

b. Why is small amount of ethanol added to a bottle containing 'A'.

[2]

c. What happen when 'A' is treated with acetone in presence of aqueous KOH ?

[1]

2. Ethanol is an excellent antiseptic and antimicrobial which can be used as sanitizers and medical wipes.

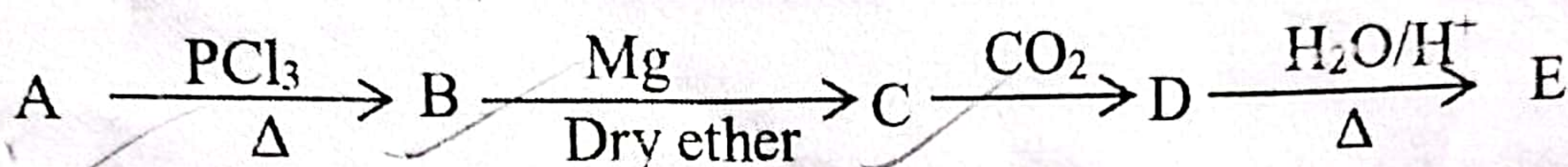
a. Write the chemical reaction for the formation of ethanol by fermentation process. [2]

b. What is absolute alcohol? It is also called anhydrous alcohol. Why? [1]

c. Convert propane-1-ol to propane-2-ol and vice versa. [2]

3. a. What do you mean by unsymmetrical ether? Write an example and IUPAC name. [2]

b. Consider a reaction, [3]



The compound 'A' is a primary alcohol which on oxidation gives ethanal. Identify A, B, C, D and E.

4. A carbonyl compound 'A' gives both tollen's and iodoform test.

a. Identify the compound 'A' with its IUPAC name. [1]

b. How does the compound 'A' react with dil. NaOH? Write involved chemical equation. Write the name of the reaction. [2]

c. How can you prepare 'A' by Rosenmund's reduction? [1]

d. How can you obtain 'A' by oxidation of ethanol? [1]

5. Write an example of each of the following.

a. 2,4-DNP test

b. Williamson's Synthesis

c. Perkin condensation

d. Dehydration of alcohol

e. Wurtz-Fittig reaction

OR

a. What happen when,

i. Secondary propyl alcohol is heated with copper at 300°C

ii. Condensation of benzaldehyde in presence of alcoholic KCN.

b. Give reason,

i. Chloroform cannot give white ppt with AgNO_3 solution.

ii. It is dangerous to boil sample of ether stored for a long time.

iii. Alcohol is weaker acid than water.

Group 'C'

Long answer questions.

[1 x 7.5 = 7.5]

6. a. Define rate reaction. Write its unit. [1.5]

b. Differentiate between order and molecularity of a reaction. [2]

c. The following experimental data were obtained for the reaction



[4]

Expt No	[A] mol L ⁻¹	[B] mol L ⁻¹	Initial rate mol L ⁻¹ s ⁻¹
1	0.20	0.20	<u>3x10⁻³</u>
2	0.40	0.20	1.2x10 ⁻²
3	0.20	0.40	<u>6x10⁻³</u>
4	0.60	0.20	<u>9x10⁻³</u>

i. Write the order of reaction w.r.t. A and B and overall order of reaction

ii. Write rate law equation.

iii. Calculate the value of k.

iv. Calculate the rate of formation of C when [A] = 0.2 mol l⁻¹ and [B] = 0.4 mol l⁻¹.

Best of luck



सुकुना माध्यमिक विद्यालय
सुन्दरहरैचा १०, मोरङ
प्रथम त्रैमासिक परीक्षा २०८१

विषय : अनिवार्य नेपाली (००२१)
कक्षा : १२

समय : १:३० घण्टा
पूर्णाङ्क : ३७.५

१. अनुच्छेदमा रेखाङ्कन गरिएका शब्दहरूको अक्षर संरचना देखाई अक्षर सङ्ख्यासमेत देखाउनुहोस् : ३
- काम गर्दा असफल भइन्छ कि भन्ने आशङ्का गर्नु हुँदैन । संसारमा जति पनि व्यक्ति सफल भएका छन्, ती सबै लगनशील र परिश्रमी छन् ।
२. तलको अनुच्छेदलाई शुद्ध गरी पुनर्लेखन गर्नुहोस् : ३
- वर्तमान नेपाल का नयाँ चुनौतीमध्ये ज्येष्ठ नागरिकहरूको भविष्य व्यवस्थापन पनि टड्कारो छ उहिलेको संयुक्त परिवार अहिले छिन्नभिन्न छ ।
३. कुनै एक प्रश्नको उत्तर दिनुहोस् : २
- (क) दिइएका अंशबाट एकओटा पारिभाषिक शब्द र एकओटा अनुकरणात्मक शब्द पहिचान गरी वाक्यमा प्रयोग गर्नुहोस् :
- कार्यालयको बेरुजु रकम बढेपछि ऊ मानसिक अन्तर्द्वन्द्वमा फस्यो । त्यसपछि कार्यक्षेत्रबाट जुरुक्क उठेर सुटुक्क घरतिर लाग्यो ।
- (ख) दिइएको अनुच्छेदबाट एउटा उखान र एउटा टुक्का पहिचान गरी तिनलाई वाक्यमा प्रयोग गर्नुहोस् :
- अकबरी सुनलाई कसी लाउनुपर्दैन भने भैं सानैदेखि पढाइमा अब्बल श्यामकान्तले लोकसेवा उत्तीर्ण गरेर आमाबाबुको नाक राख्यो । गाउँका सबैले मुख फोरेरै उसको तारिफ गरे । परिश्रमीका भागेमा माछामासु अल्छीका आँखामा आँसु भनै भैं पो भयो भनी गाउँले सबैले भन्न थाले ।
४. तलका अनुच्छेदमा रेखाङ्कन गरिएका पदहरूको शब्दवर्ग पहिचान गरी लेख्नुहोस् : २.५
- त्यो केटो एक्कासि बाटामा लड्यो अनि हामी नजिकै गयौं । हामीले एम्बुलेन्स भिकायौं । अस्पताल लगेर उपचार गरेपछि उसको होस खुल्यो ।
५. तलको अनुच्छेदबाट दुईओटा तत्सम र दुईओटा आगन्तुक शब्द पहिचान गरी लेख्नुहोस् : २

शीतल वायुमा आनन्द मान्दै कम्प्युटर चलाउँदै गरेको हर्कले जीवनमा आत्मीय मित्र फेला पारेपछि उसलाई एउटा मोबाइल र व्याग पनि उपहार दिएको रहेछ ।

६. कुनै एक प्रश्नको उत्तर दिनुहोस् : ३

(क) सामान्य आदरमा रूपान्तरण गरी पुनर्लेखन गर्नुहोस् :

तपाईं आज पनि कतै जानुहुन्छ कि ? अहिलेको समयमा यसरी बाहिरतिर घुम्न ननिस्कनुहोस् । घरभित्रै बसेर व्यायाम गर्नुहोस् ।

(ख) तलका अनुच्छेदका वाक्यहरूलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् :

मेरो साना छोराछोरी स्कूल जान्छ । मेरो छोराछोरीले दिनरात नभनी परिश्रम गर्छ । उनीहरू भविष्यमा योग्य नागरिक बन्छ ।

७. कुनै एक प्रश्नको उत्तर दिनुहोस् : ३

(क) तल दिइएका छोटो सरल वाक्यलाई तीन ओटा जटिल वाक्य बनाई लेख्नुहोस् :

म अहिले पढ्दै छु । म भोलि देशको उच्च तहमा पुग्ने छु । हाम्रो देशमा विविध सम्भावना छन् । म रोजगारी सिर्जना गर्छु । सहिदका सपना अधुरै रहेका छन् । हामी सहिदका सपना पूरा गर्न चाहन्छौं ।

(ख) तल दिइएका वाक्यहरूलाई बहुवचनमा परिवर्तन गरी पुनर्लेखन गर्नुहोस् :

मेरो भाइ विद्यालय जान्छ । ऊ असल र ज्ञानी छ । बहिनी मिलेर बस्छे । उसले परिवारको इज्जत राखेकी छे । मेरो दाजु पोखरा घुम्न गयो । उसले त्यहाँको रमाइलो ठाउँ घुम्यो ।

८. दिइएको अनुच्छेद पढी अन्त्यमा सोधिएका प्रश्नको उत्तर लेख्नुहोस् : ४

जीवनको एउटा तर महत्त्वपूर्ण अंशलाई समेट्ने विशिष्ट घटनाको सिलसिलेवार प्रस्तुति कथा हो । यिनै घटनाको कार्यकारण शृङ्खलालाई कथानक भनिन्छ । कथाको आकार र स्वरूप तयार पार्ने कार्यमा कथानकले महत्त्वपूर्ण भूमिका निर्वाह गर्ने भएकाले यसलाई कथाको मुख्य तत्वका रूपमा लिने गरिन्छ । कथामा घटना अघि बढाउने वा कार्यव्यापार सम्पन्न गर्न पात्रको प्रयोग गरिएको हुन्छ । पात्र मानवीय र मानवेतर गरी दुवै किसिमका हुन्छन् । कथा भन्ने पात्रलाई समाख्याता भनिन्छ । समाख्याता कथाभित्रकै पात्र पनि हुन सक्छ र कथाबाहिरको पनि हुन सक्छ । कथाको पात्र आफैले कथाको समाख्यान गरेको छ भने त्यसलाई प्रथम पुरुष दृष्टिबिन्दु भएको कथा र अन्य पात्रका माध्यमबाट कथाको समाख्यान गरिएको छ भने त्यसलाई तृतीय पुरुष दृष्टिबिन्दुको प्रयोग भएको कथा भनिन्छ । प्रथम पुरुष दृष्टिबिन्दु भएका कथामा 'म' र 'हामी' जस्ता प्रथम पुरुषलाई बुझाउने पदको प्रयोग गरिएको हुन्छ भने तृतीय पुरुष दृष्टिबिन्दु भएका कथामा 'त्यो, ऊ, तिनीहरू' आदि तेस्रो पुरुष बुझाउने पदको प्रयोग गरिएको हुन्छ । घटनाको समय, स्थान र त्यसबाट उत्पन्न हुने

वातावरणलाई परिवेश भनिन्छ । कथाले भन्न खोजेको मूल कुरा सारवस्तु हो । यसैलाई सन्देश पनि भनिन्छ । यी सबैलाई प्रस्तुत गर्ने माध्यम चाहिँ भाषा हो । कथामा गद्य भाषाको प्रयोग हुन्छ । कथालाई प्रभावकारी रूपमा अघि बढाउन पात्रका बिचमा संवाद पनि हुन सक्छ । कथाको भाषालाई वर्णनात्मक, पात्रात्मक, संस्मरणात्मक, नाटकीय आदि शैलीमा प्रस्तुत गर्न सकिन्छ । यसैले कथानक, पात्र, परिवेश, दृष्टिबिन्दु, भाषाशैली र सारवस्तु यी सबै कथाका तत्त्व हुन् ।

प्रश्नहरू :

(क) कथा भनेको के हो ?

(ख) कथामा कति किसिमका पात्र हुन्छन् ?

(ग) प्रथम पुरुष दृष्टिबिन्दु भएका कथामा कस्ता पदको प्रयोग गरिएको हुन्छ ?

(घ) कथाका तत्त्व के के हुन् ?

९. तपाईंको आफ्नो स्थायी ठेगानाको कृष्णदत्त शर्माले सोही स्थानमा बसोवास गर्ने रामकृष्ण गैरेसँग ऋण लिएको रु. ५०,०००/- को व्यहोरा खुलाई एउटा तमसुकको नमुना लेख्नुहोस् ।

४

अथवा

सुकुना पुस्तक पसल सुन्दरहरैँचा १० ले साभा प्रकाशन काठमाडौँबाट प्रकाशित कक्षा ११ र १२ का अनिवार्य नेपाली पुस्तक पठाइदिन भनी लेखिने पत्रको नमुना तयार पार्नुहोस् ।

१०. कुनै एक प्रश्नको भाव विस्तार गर्नुहोस् : ४

(क) 'नारी प्रेम र सङ्घर्षका प्रतिमूर्ति हुन्' यस भनाइलाई 'विरहिणी दमयन्ती' कथाका आधारमा लेख्नुहोस् ।

(ख) यो हिउँ मेरो थियो, मेरो मुटुको थियो र हिमाली हार्दिकता बोकेको र चम्किलो थियो ।

११. दिइएका शीर्षकमध्ये कुनै एक शीर्षकमा २५० शब्दमा नघटाई निबन्ध लेख्नुहोस् । ७

(क) राष्ट्रप्रति मेरो कर्तव्य

(ख) प्रविधियुक्त शिक्षा

(ग) निर्वाचनमा युवाको भूमिका

सफलताको शुभकामना !



SUKUNA SECONDARY SCHOOL

Sundarharaincha-10, Morang

FIRST TERMINAL EXAMINATION-2081

Class: XII Science

Subject: Physics

Full Marks: 37.5

Time: 1.5 hr

Group 'A'

[5×1=5]

Rewrite the correct options of each question in your answer sheet.

- The spokes are used in bicycle wheel to
(a) Increase frictional force (b) Decrease frictional force
(c) Increase moment of inertia (d) Decrease moment of inertia
- The efficiency of Carnot engine working between steam point and ice point is about
(a) 16.8% (b) 26.8%
(c) 36.8% (d) 46.8%
- The phase difference between two waves $y_1 = A \sin \omega t$ and $y_2 = A \cos \omega t$ is
(a) 0° (b) π
(c) $\pi/2$ (d) $\pi/4$
- Which of the following is not reversible?
(a) Seebeck effect (b) Peltier effect
(c) Joule's effect (d) Thomson's effect
- In photoelectric effect, stopping potential depends on
(a) Frequency of incident light (b) nature of the emitter materials
(c) intensity of incident light (d) both (a) and (b)

Group "B"

[5×5=25]

- The moment of inertia of a body about a given axis is the property under which, the body opposes any change in its state of rest or state of uniform rotations about that axis.
(a) Define the term radius of gyration. [1]
(b) Define the moment of inertia and prove the kinetic energy of a rotational body is $\frac{1}{2} I \omega^2$, where the symbols have their usual meanings. [2]
(c) State the principle of conservation of angular momentum. Write any two applications of it. [1+0.5+0.5]

2. The thermodynamic process is the change of thermodynamic variables in a system of different conditions.

(a) Derive an expression for work done by an ideal gas in an isothermal process. [2]

(b) Calculate the work done when one mole of perfect gas is compressed adiabatically. The initial pressure and volume of the gas are 10^5 Nm^{-2} and 6 liters respectively. The final volume of the gas is 2 liters. Molar heat capacity of the gas at constant volume is $\frac{3}{2}R$. [3]

Or,

(a) Why do Diesel engines need no spark plugs, whereas petrol engines need them? [2]

(b) Describe the working mechanism of a Diesel engine with the help of P-V diagrams. [3]

3. (a) Explosions on other planets are not heard on earth, why? [1]

(b) Write Newton's formula for the velocity of sound in air and explain why and how it was corrected by Laplace? [2]

(c) At what temperature, the velocity of sound in air is increased by 50% to that at 27°C ? [2]

4. (a) Define organ pipes. [1]

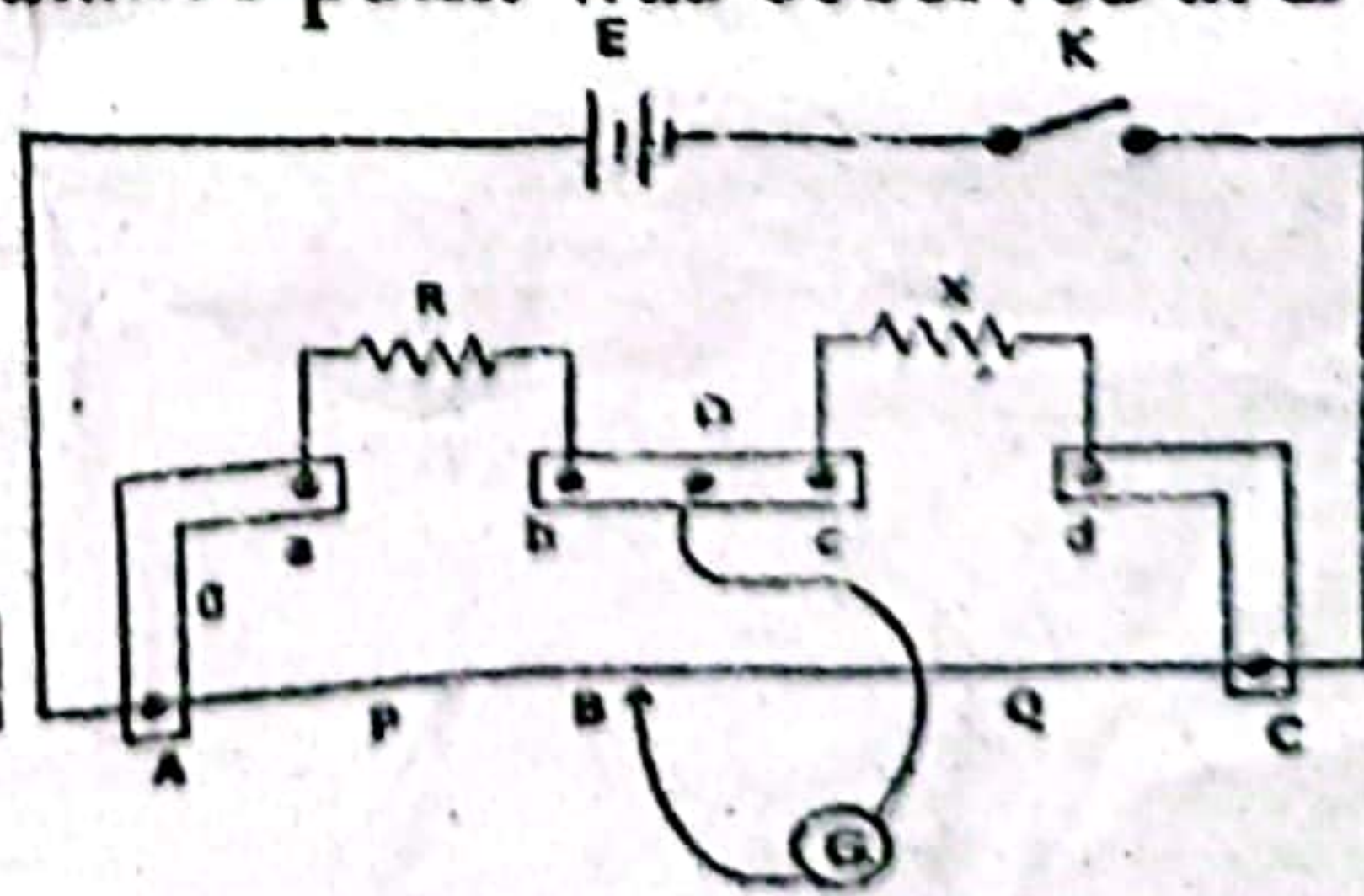
(b) Describe the various modes of vibration of the air column in closed organ pipes. [3]

(c) What is end correction? [1]

5. (a) State the principle of potentiometer. A potentiometer is also called a voltmeter of infinite resistance, why? [1+1]

(b) in the meter bridge experiment the balance point was observed at B point with $L = 35 \text{ cm}$.

(i) if the value of R be doubled of X and then interchanged. What would be the new position of balance point? [2]



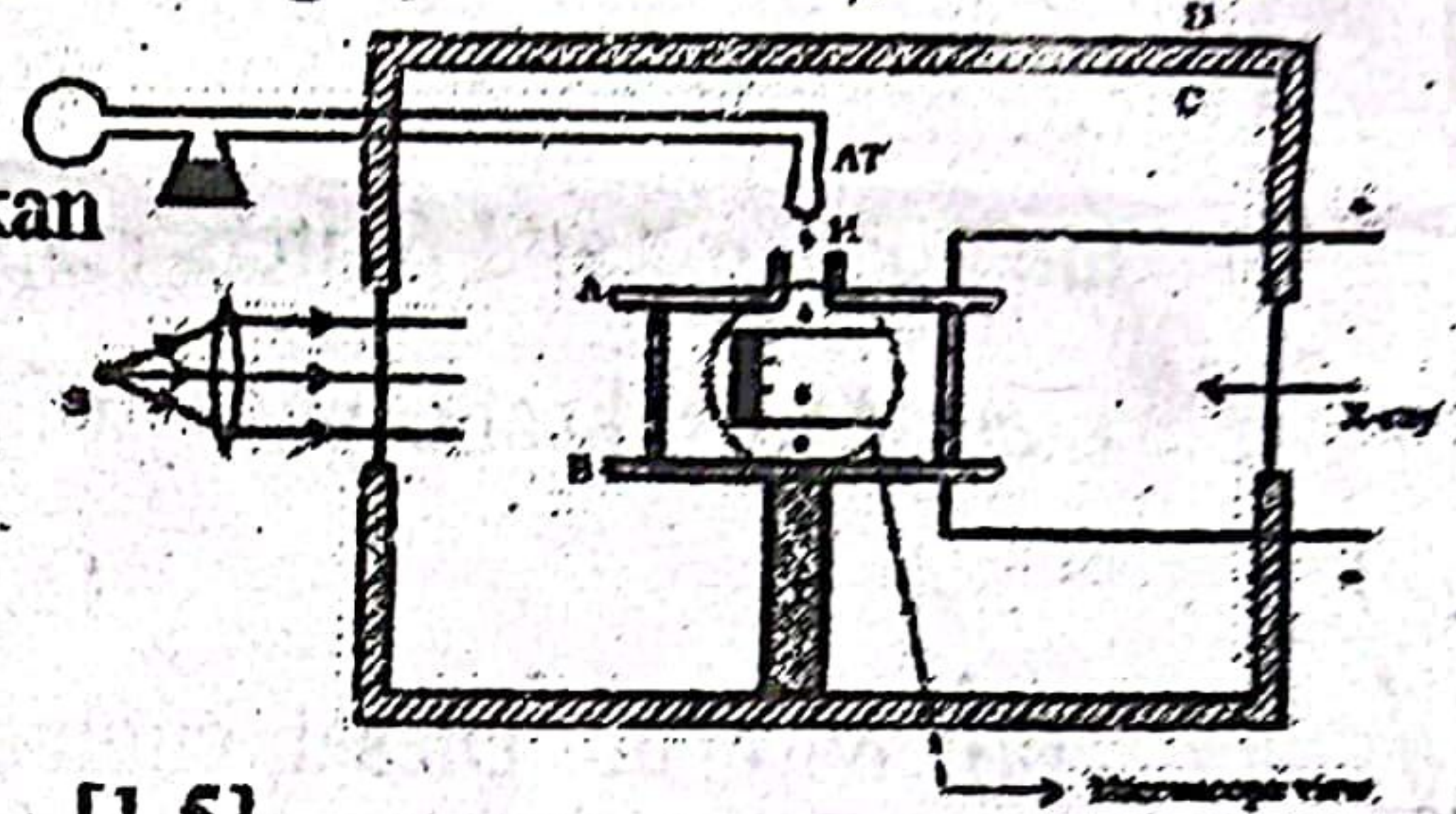
(ii) if the galvanometer and battery are interchanged at the balance position, how will the balance point get affected? [1]

Group "C"

[1×7.5 = 7.5]

1. (a) Figure represents the experimental arrangement for Millikan's oil drop experiments.

- i) For what purpose did Millikan use this apparatus? [1]
 - ii) Why atomizer and x-ray are used? [2]
 - iii) Why water drops cannot be used instead of oil? [1.5]
 - iv) What would be the effect on Millikan's oil drop experiment of performing, it in vacuum? [1]
- (b) 400nm wavelength of light falls on a photo sensitive materials of work function 2.3 eV. Compute the maximum energy of photoelectrons. [2]



!!! GOOD LUCK !!!

Note Mandali



Shree Sukuna Secondary School

Sundarharaincha – 10, Morang

First Terminal Examination – 2081

Grade – XII

Time: 1 hr 30 mins. Compulsory English (Eng. 003)

F.M.:37.5

I. Read the following passage and answer the questions that follow: [8]

Measuring Snowfall

Despite many high-tech instruments now available to scientists who study the weather, one measurement remains relatively difficult to make, and that's calculating how much snow actually falls in any particular place during a snowstorm. This explains why the National Centre for Atmospheric Research (NCAR) in the USA is experimenting with new ways of achieving a greater level of accuracy in snowfall figures. As their representative Ethan Guttman points out, "You'd think it was just a matter of going out and sticking a ruler in the snow and measuring how much is on the ground. The problem is, if you move the ruler over just a few centimetres, you may get a different reading."

In fact, the taking of measurements is complicated by a number of factors; for example, the first snowflakes may melt as soon as they hit warm surfaces, while others are whisked away by the wind leaving some ground bare and other places buried under deep snowdrifts. Guttman's colleagues have been testing a number of new snow-measuring devices, including ultrasonic snow depth sensors, which send out a pulse of noise and measure how long it takes to bounce back from the surface below the snow, and laser sensors which work on the same basic principle but use light instead of sound. Another device for measuring snowfall is a type of open container with motor-vehicle antifreeze inside it. The antifreeze melts the snow as it falls and sensors measure the weight of the resulting liquid. NCAR scientists have also experimented with using Global Positioning Satellites (GPS) to measure snow depth. It may be possible for signals sent from these satellites to measure the distance to both the surface of the snow and to the ground beneath it. Not only would this method be more cost-effective than other methods, but it might also be particularly useful for measuring the snow in remote locations such as inaccessible upland areas and the highest mountain peaks and ranges.

The scientists also learned that they could improve the results of both manual and high-tech methods of snow measurement by using something known as a snow board. Basically, this is just a flat piece of white-painted wood on which snow can accumulate. Windshields placed around these can also add to the accuracy of measurement.

A. Complete the sentences using the highlighted words in the text. Two of them are not necessary. (4x1=4)

- They chose him as their
- They were unable to enough evidence to make a well-written claim.
- The security device has a heat which detects the presence of people and animals.
- The mountain tops were of any vegetation.

B. Answer the following questions. (4x1=4)

- What do NCAR and GPS stand for?
- According to Ethan Guttman, what is not so easy?
- What is the function of ultrasonic snow depth sensors?
- 'Basically, this is just a flat piece of white-painted wood on which snow can accumulate.'
What does the word 'this' indicate?

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2. Write short answers to the following questions. (Any four) (3x2=6)

- Where could the author be found when he was late for lunch or dinner? (*On Libraries*)
- How did the young couple identify their neighbours in the beginning of their arrival? (*Neighbour*)
- Who are the 'poor creatures'? Why does the speaker call them 'poor creatures'? (*Every Morning I Wake*)
- Why was Mrs. Baroda unhappy with the information about Gouvernail's visit to their farm? (*A Respectable Woman*)

3. Write long answers to the following questions. (Any one) (4x1=4)

- Write the summary of the poem "A Day".
- Sketch the character of the Famous Actress. (*A Matter of Husbands*)

4. Write a couple of paragraphs on "QR Code" in about 150 words. 5

5. Suppose there is a post vacant for a chef at Hotel Birat Diamond, Biratnagar (Morang). Now apply for the post as an eligible and experienced candidate. 6.5

Or,

Write an essay on "The Trend of Going Abroad for Education" in about 200 words shedding the light on pros and cons of studying abroad. 6.5

6. Do as instructed. [8x1=8]

- Nobody hit the ball to the goalpost,? (Put a correct question tag)
- It rained heavily. We enjoyed our picnic. (Join the sentences using Despite)
- Can you tell me where the headteacher's office is? (Change into direct question)
- Did you see the hunter aiming the frightened deer? (Complete the sentence with the correct preposition.)
- I like people admiring my voice. (Change into passive.)
- "I am a good listener but not a good speaker." (Report the sentence starting with She says)
- Which of the following words has a voiced consonant sound in the initial position?
i. watch ii. chair iii. culture iv. vulture
- She visits Dr Sigdel once in a blue moon. It means she Dr Sigdel.
i. often visits ii. rarely visits
iii. visits on the lunar day iv. visits frequently.

The End

14

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Sukuna Secondary School

First Terminal Examination-2081

(Morning shift)

Time: 1 hour

F.M: 25

Grade: XII

Subject: Computer Science

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Group 'A' (Multiple Choice Questions)

Attempt all questions

[5×1=5]

1. Tick the best alternatives.

i. A function which calls itself is called a function.

- a. Self-function
- b. Auto-function
- c. Recursive function
- d. Static function

ii. What is the output of C program.

```
int sukuna(int,int);
int main()
{
    sukuna(101,102);
    return 0;
}
int sukuna(int b,int a)
{
    printf("Room %d, Room %d",a,b);
}
```

- a. Room 101, Room 102
- b. Room 102, Room 101
- c. Room 0, Room 0
- d. Compiler error

iii. Which features of OOP refers to code reusability?

- a. Abstraction
- b. Inheritance
- c. Polymorphism
- d. Encapsulation

iv. Requirement collection methods include

- a. interview
- b. questionnaire
- c. workshop
- d. All of the above

v. is an environment that looks real.

- a. Big data
- b. AI
- c. Virtual Reality
- d. e-commerce

Group 'B'

Give short answer to the following questions.

[4×3=12]

2. Describe the types of e-governance. [4]
3. What is prototype model? Write its advantages and disadvantages. [1+3]

OR

Explain the importance of feasibility study in SDLC. [4]

4. What is OOP? List any three differences between POP and OOP. [1+3]

Group 'C'

Give long answer to the following questions.

[1×8=8]

5. What is function? Explain its types. WAP to find the factorial of a given number using recursive function. [1+3+4]

-Best of Luck-

Note Mandir

Sukuna Secondary School

Sundarharaicha-10, Morang

1st terminal Examination-2081

Class-12

Full mark-37.5

Sub- Maths

Time-1.5 hour

Group-A

Attempt all questions

Rewrite the best answer from the following options. $5 \times 1 = 5$

1. In how many ways can 6 gentleman and 4 ladies be seated in a round table?
a. $9!$ b. $5! \times 4!$ c. $5! \times 3!$ d. $5! \times 6C4$
2. In the expansion of $\left(x - \frac{1}{3x^2}\right)^9$ the term independent of x is....
a. t_3 b. t_4 c. t_5 d. t_6
3. In a ΔABC , If $4a=b+c$, then $\tan \frac{B}{2} \cdot \tan \frac{C}{2} = \dots$
a. $\frac{1}{3}$ b. $\frac{3}{5}$ c. $\frac{2}{3}$ d. $\frac{1}{2}$
4. The eccentricity of hyperbola $x^2 - y^2 = 9$ is...
a. less than 1 b. 1 c. $\sqrt{2}$ d. none of these

The value of $\left(\frac{1+\omega}{\omega^2}\right)^2$ is ...

- a. 1 b. -1 c. ω d. ω^2
5. If $y = \ln(\ln x)$ the derivative of y is
a. $\frac{dy}{dx} = \frac{1}{\ln x}$ b. $\frac{dy}{dx} = (\ln x)^2$ c. $\frac{dy}{dx} = \frac{1}{x \ln x}$ d. $x \ln x$

Group B $(5 \times 5 = 25)$

6. a. It is required to sit 5 boys and 4 girls in a row so that the girls occupy the even places. How many such arrangement are possible? 2
b. Out of 6 ladies and 8 gentleman a committee of 11 is to be formed. In how many ways can this be done if the committee contains. (i) at least 4 ladies? (ii) at most 4 ladies? 3
7. a. In the expansion of $(1+x)^{2n+1}$, the coefficient of x^r and x^{r+1} are equal. Find the value of r ? 2
b. If $(1+x)^n = C_0 + C_1 x + C_2 x^2 + \dots + C_n x^n$ then prove that 3
$$C_0 C_2 + C_1 C_3 + C_2 C_4 + \dots + C_{n-2} C_n = \frac{(2n)!}{(n-2)!(n+2)!}$$
8. a. Find the conditions for the line $lx + my + n = 0$ to be a normal to the parabola $y^2 = 4ax$ 2
b. Find coordinates of vertices, eccentricity, coordinate of foci and equation of directrix of hyperbola $16x^2 - 9y^2 + 96x - 72y + 144 = 0$ 3

a. Show that $\frac{a+b\omega+c\omega^2}{b+c\omega+a\omega^2} = \omega$ where ω and ω^2 are cube root of unity of complex number. 2

b. Write complex number $(\cos\theta + i \sin\theta)$ in Euler's form. If $z = \cos\theta + i \sin\theta$ find the value of $z^n + \frac{1}{z^n}$ by using De-Moivre's theorem. 1+2

9.a. Solve the following system of equations by row equivalent matrix method. 3

$$4x - 5y + 2z = 1, 3x - 4z = 10, 2y = 3z - 6$$

b. Solve the equation by Cramer's rule 2

$$x - 2y - z = 7, 2x + y + z = 0, 3x - 5y + 8z = 13$$

10.a. If the sides of a triangle are proportional to $2 : \sqrt{6} : \sqrt{3} + 1$, find the angles? 2

b. In ΔABC , if $(\cos A + 2 \cos C) : (\cos A + 2 \cos B) = \sin B : \sin C$, prove that the triangle is either isosceles or right angled? 3

or

Use simplex method and maximize $z = 15x + 12y$ subject to 5

$$2x + 3y \leq 21, 3x + 2y \leq 24, x, y \geq 0$$

Group C ($7.5 \times 1 = 7.5$)

11.a. Find the derivative with respect to x of $x^{\cosh^{-1} \frac{x}{a}}$ 2

b. prove that $1 + \frac{1}{4} - \frac{1}{4 \cdot 8} + \frac{1 \cdot 1 \cdot 3}{4 \cdot 8 \cdot 12} - \frac{1 \cdot 1 \cdot 3 \cdot 5}{48 \cdot 12 \cdot 16} + \dots \dots \dots \text{to } \infty = \sqrt{\frac{3}{2}}$ 2.5

c. Prove that the circles $x^2 + y^2 + 2ky + 2ly = 0$ and $x^2 + y^2 + 2mx + 2ny = 0$ touch each other if $\frac{k}{m} = \frac{l}{n}$ 3

or

Solve by De-Moivre's theorem $z^4 + 1 = 0$