Subject- English Core   **Marks- 40**

Class-XI   **Time- 1:30 Hours**

General instructions:

1. **The paper is divided into three sections: A, B , C & D. All the sections are compulsory.**

2. **Separate instructions are given in each section and question, wherever necessary. Read these instructions carefully and follow them faithfully.**

3. **Don't exceed the prescribed word limit while answering the questions.**

Section -A- Reading   (10 Marks)

Q.1.   **Read the passage carefully and answer the questions   that   follow.**

1.   In my most frustrated moment of navigating chaotic Delhi traffic, I close my eyes in the back seat and imagined what it would be like if someday just a thought would transport me from one place to another.

2. At times, sitting relaxed on my terrace, I look at the green tree tops that I see every day and   wonder if some day, just with the power of my thoughts I would be able to create the image of the most vivid blue ocean and sandy beach in front of me? Then having had enough of that could my thoughts switch the scene to that of Snowy Mountain peaks?

3. Just thinking of these seemingly impossible things give me a sense of well –being, because I do believe that if you can think it, you can will it and achieve it. If it occurs as a thought, it is possible to fructify as reality. After all, everything big started with a thought. Looking at birds flying freely in the sky, humans must have thoughts of the possibility of flying centuries before the invention of aeroplanes. The tallest skyscraper, the longest bridge across the ocean, the fastest train, the internet, the cell phone- all are the end result of one thought.

4. As technology advances we become more confident in our abilities to transform thoughts to reality, the gap between the ideas and implementation keeps shrinking. Today one of the biggest thrills of living is watching impossible-seeming thoughts turn to reality within one's life time!

5. If with the power of his 'Big thought' Donald Trump becomes the president of the USA, what then is impossible? As he says in his book, 'Think like a millionaire' "I like thinking big. To me it is very simple. If you are going to be thinking anyway, you might as well think big".

6. True. None of the big achievements or discoveries in life happened by thinking small. To achieve big stuff, you have to think big. Most people avoid thinking big because of laziness, fear of extra work and the instinct to stay unnoticed--- and hence out of trouble. A large part of the work force just wants to do their designated work and get done with it.

7. And then there are those who let their own small success become the enemy of possible bigger success,

later. Sitting back to celebrate a small achievement, they underestimate their own potential whoever say that aspirations or possibilities have any limitations? The most pleasurable moment can be spent imagining what seems the impossible ---- come on; let your imagination run wild! Believe in yourself and your thoughts. Some of the tips Donald Trump shares mould yourself to think bigger are, "Walk softly but carry a big attitude, conquer your doubts and ditch them; be proud of your big ego and get into the habit of speaking of your mind".

8. The power of thought is a form of energy that is impervious to time, space and present reality. It is important to hone and direct your thoughts towards bigger and better, impossible – to – imagine things. What you believe about yourself and what you believe about possibilities is crucial to not just what you become, but also critical to the world as we all experience it ---- now and in the future.

9. Dreams and thoughts must rule free without any limitations. Thoughts have to reach beyond and encompass the impossible, the unthinkable, the weird, the unheard of and the shocking. Think beyond the realms of possibility and then aim to get there. Once there, think much beyond that possibility too. And then get going once again.

a. **On the basis of your reading of the passage, answer the following questions by choosing most appropriate option.** 1x4=4

 i. **……………………………… that make (s) living more thrilling in modern times.**

  a. Big thoughts

  b. Watching impossible- seeming thoughts turn to reality within one's life time

  c. Think small

  d. All of these

 ii. **The passage suggests that …………………………………**

  a. One should stop after making a seemingly- impossible, possible

  b. Dreams and thoughts should have limitations

  c. One should continue to think big forever

  d. Time, space and present reality affect the power of thought

 iii. **……………….. Stop (s) people from achieving big.**

  a. Avoiding thinking big

  b. Sitting back to celebrate small success

  c. Underestimating their potential

  d. All of these

 iv. **The author's wish list does not include ----------------------------**

  a. Just a thought transporting her from one place to another

  b. Creating the image of blue ocean in front of her

  c. Switching the blue ocean image into that of snowy mountain peaks

  d. Feeling frustrated while navigating chaotic Delhi traffic

b. **Answer the following questions as briefly as possible.** 1x4= 4

i. Thinking of impossible things gives the author a feeling of well- being. Why?

ii.   Why do many people don't think big?

iii.   Name any two wonderful results   associated with   seemingly impossible thoughts.

iv.   What prevents bigger success in case of many persons ?

c. Find the words/phrases in the passage which means the same as: **1x2=2**

     i.   Qualities and abilities (para-7)

     ii.   Include, cover   (para-9)

SECTION – B – Writing Skill   7 marks

     You are xyz from Anujyotee Colony, Rawatbhata. You realize the significance of   Yoga in modern life. It has become a panacea for all problems. Based on this fact, write an article in 180 – 200 words on the topic, "The Importance of   Yoga in Modern Life".

OR

     You are abc from Mahaveer Nagar, Kota. Games and sports is an important part of life. Write an article on the importance of participation in games and sports highlighting the dictum, "A   Healthy Mind in a Healthy Body". (word limit – 180 – 200 words)

Section C – Grammar   6 marks

Q. 2. There is an error in the use of verb in most of the following lines. Find the error and write the correct word in your answer sheet. The first one has been done as an example.

                                  1/2 x 8 = 4

On 10th November, 1910 Tolstoy suddenly decides	**e.g. decide … <u>decided</u>**
to renounce his home. He is accompanied by	**(a)**
his daughter and his doctor. He leave	**(b)**
his house in the middle of the night. He reach	**(c)**
the following day the monastery of Uptina	
and spend the night there writing an article.	**(d)**
On 12th he reached the Convent where his	
sister, Marie had been stayed as a nun.	**(e)**
He told his sister that he will like to	**(f)**
live in the Convent if no pressure is put	**(g)**
on him to enter the church. The visit can	**(h)**
not be kept a secret.	

Q.3. The sentences given below are in a disorderly form. Reorder them to form meaningful sentences.   **2x1**

     a. the/two/thieves/yesterday/caught/police

     b. watered/has not/the plants/so far/ the gardener

SECTION - D – Literature   17 marks

4. Read the following extract from the poem, "A Photograph" and answer the questions.   **3x1**

Now she's been dead nearly as many years

As that girl lived. And of this circumstance

There is nothing to say at all.

Its silence silences.

a.   Who is the poet ?

b.   Who does 'she' refer to ?

c.   What does 'this circumstance' mean ?

5. Answer   any   four   of   the following questions in 30 – 40   words   each. (2x 4 = 8)

a.   Why did the grandmother 'hate' music ?

b.   How does the laburnum tree appear in September ?

c.   Whom did the narrator and his family want to duplicate and why ?

d.   How did they pass the first leg of their journey ?

e.   What were the members of the Garoghlanian family proud of ?

f.   Who   was   John   Byro ? Why had he come to the narrator's house ?

6.   Answer the following question in 120 words.

Justify the title of the story, 'The Address'. Why did the narrator resolve to forget the address. ? Why of all the things she had to forget 'that would be the easiest?'   **6**

OR

Describe in brief the pen – picture of the narrator's grandmother highlighting her noble qualities.

****
ALL   THE   BEST

परमाणु ऊर्जा केंद्रीय विद्यालय- नं.4 ,रावतभाटा

ऑनलाइन डिस्क्रिप्टिव   टेस्ट -1   दि. 24 /09/2020

कक्षा -ग्यारहवीं,   विषय –हिंदी   समय 1 घंटा 30 मिनट   पूर्णांक- 40

प्रश्न 1.निम्नलिखित से किन्ही तीन प्रश्नों के उत्तर लिखिए -   3x3=9

क. कबीर की दृष्टि में ईश्वर एक है। इसके समर्थन में उन्होंने क्या तर्क दिए हैं?

ख. कबीर ने नियम और धर्म का पालन करनेवाले लोगों की किन कमियों की ओर संकेत किया है?

ग. मीरा कृष्ण की उपासना किस रूप में करती हैं? वह रूप कैसा है?

घ. लोग मीरा को बावरी क्यों कहते हैं?

प्रश्न 2. निम्नलिखित में से किन्ही तीन प्रश्नों के उत्तर संक्षेप में लिखिए: 3x2=6

क. मानव शरीर का निर्माण किन पांचतत्वों से हुआ है?

ख. कबीर ने अपने को दीवाना क्यों कहा है?

ग. अज्ञानी गुरुओ की शरण में जाने पर शिष्यों की क्या गति होती है?

घ. मीरा जगत को देखकर रोती क्यों है ?

प्रश्न 3. निम्नलिखित प्रश्नों में से किन्ही तीन प्रश्नों के उत्तर संक्षेप में दीजिए: 3x2=6

क. कहानी का कौन-सा पात्र आपको सर्वाधिक प्रभावित करता है और क्यों?

ख. नमक का दारोगा कहानी में पंडित अलोपीदीन के व्यक्तित्व के कौन-से दो पहलू (पक्ष)उभरकर आते हैं?

ग. मियां नसीरुद्दीन को नानबाइयों का मसीहा क्यों कहा गया है?

घ. लेखिका मियां नसीरुद्दीन के पास क्यों गई थी?

प्रश्न 4.निम्नलिखित प्रश्नों में से किन्ही तीन प्रश्नों के उत्तर लिखिए: 3x3=9

क. नमक विभाग के दारोगा पद के लिए बड़ों- बड़ों का जी ललचाता था वर्तमान समाज में ऐसा कौन-सा पद होगा जिसे पाने के लिए लोग लालायित रहते होंगे और क्यों?

ख. कहानी के अंत में अलोपीदीन के वंशीधर को मैनेजर नियुक्त करने के पीछे क्या कारण हो सकते हैं? तर्क सहित उत्तर दीजिए।

ग. पाठ में मियां नसीरुद्दीन का शब्दचित्र लेखिका ने कैसे खींचा है?

घ. मियां नसीरुद्दीन तीसरी पीढ़ी के हैं जिसने अपने खानदानी व्यवसाय को अपनाया वर्तमान समय में प्रायः लोग अपने पारंपरिक व्यवसाय को नहीं अपना रहे हैं । ऐसा क्यों?

प्रश्न 5. नीचे दिए वाक्यों में अर्थ पर बल देने के लिए शब्द क्रम परिवर्तित किया गया है । सामान्यतः इन वाक्यों को किस क्रम में लिखा जाता है ? लिखें? 2x5=10

क. मियां मशहूर हैं छप्पन किस्म की रोटियां बनाने के लिए।

ख. निकाल लेंगे वक्त थोड़ा।

ग. दिमाग में चक्कर काट गई है बात।

घ. रोटी जनाब पकती है आंच से।

ङ. आ बैठे उन्हीं के ठीये पर।

ATOMIC ENERGY CENTRAL SCHOOL NO.4 RAWATBHATA

MCQ Examination September (2020-2021)

CLASS 11 - MATHEMATICS

Mathematics

Time Allowed: 1 hour and 30 minutes   **Maximum Marks: 40**

Section A

1. Which of the following is a set?   **[1]**

   A. A collection of vowels in English alphabets is a set.

   B. The collection of most talented writers of India is a set.

   C. The collection of most difficult topics in Mathematics is a set.

   D. The collection of good cricket players of India is a set.

       a) B   b) D

       c) A   d) C

2. In a class of 100 students, 55 students have passed in Mathematics and 67 students have   **[1]**
   passed in Physics. Then the number of students who have passed in Physics only is

       a) 47   b) 45

       c) 25   d) 33

3. If A = {1, 2, 3, 4, 5, 6} then the number of proper subsets is   **[1]**

       a) 63   b) 36

       c) 64   d) 25

4. Let R be set of points inside a rectangle of sides a and b (a, b > 1) with two sides along the   **[1]**
   positive direction of x-axis and y-axis. Then

       a) R = {(x, y) : $0 \leq x \leq a, 0 \leq y \leq b$}   b) R = {(x, y) : $0 \leq x < a, 0 \leq y \leq b$}

       c) R = {(x, y) : $0 < x < a, 0 < y < b$}   d) R = {(x, y) : $0 \leq x \leq a, 0 < y < b$}

5. The set A = {x : x is a positive prime number less than 10} in the tabular form is   **[1]**

       a) {2, 3, 5, 7}   b) {1, 2, 3, 5, 7}

       c) none of these   d) {1, 3, 5, 7, 9}

6. Suppose f : [2, 2] →R be defined by $f(x) = \begin{cases} -1 \ for & -2 \leq x \leq 0 \\ x - 1 \ for & 0 \leq x \leq 2 \end{cases}$, Then { x $\in$ [-2, 2]:   **[1]**
   x $\leq$ 0 and f (| x |) = x} =

       a) { - 1 }   b) ϕ

       c) $\left\{ -\frac{1}{2} \right\}$ d) {0}

7. The range of f(x) = $\frac{1}{1 - 2\cos x}$.   **[1]**

       a) [-1, 1/3]   b) [-1 /3, 1]

       c) $(-\infty, -1) \cup [1/3, \infty)$ d) [1/3, 1]

8. If $3f(x) + 5f\left(\frac{1}{x}\right) = \frac{1}{x} - 3$ for all non-zero x then f(x)= **[1]**

   a) $\frac{1}{14}\left(\frac{3}{x} + 5x - 6\right)$

   b) None of these

   c) $\frac{1}{14}\left(-\frac{3}{x} + 5x + 6\right)$

   d) $\frac{1}{16}\left(-\frac{3}{x} + 5x - 6\right)$

9. The function f : $R \to R$ is defined by f (x) = $\sin^4 x$ - $\sin^2 x$ +1 f,then R(f) = **[1]**

   a) (3 / 4 ,1)

   b) [3 /4 ,1]

   c) [3 /4 ,1)

   d) (3 / 4 ,1]

10. If n(A) = 10, n(B) = 6 and n (C) = 5 for three disjoint sets A, B and C, then $n(A \cup B \cup C)$ = **[1]**

    a) 11

    b) 21

    c) 1

    d) 9

Section B

11. Let A = {a, b} and B = {a , b, c}. Is $A \subset B$? What is $A \cup B$? **[2]**

12. If A and B are two sets such that n(A) = 54, n(B) = 39 and n(B - A) = 13 then find n(A $\cup$ B). **[2]**
    Hint: n(B) = n(B - A) + n(A $\cap$ B)

13. Let R be the set of real numbers. Define the real function f: R $\to$ R defined by f(x) = x + 10. **[2]**

Section C

14. In a survey of 200 students of a school, it was found that 120 study Mathematics, 90 study **[4]** Physics and 70 study Chemistry, 40 study Mathematics and Physics, 30 study Physics and Chemistry, 50 study Chemistry and Mathematics and 20 none of these subjects. Find the number of students who study all the three subjects.

15. If $A \times B \subseteq C \times D$ and $A \times B \neq \phi$, prove that $A \subseteq C$ and $B \subseteq D$. **[4]**

16. Draw the graph of the constant function: f(x) = 2 for all x $\in$ R **[4]**

Section D

17. In an university, out of 100 students 15 offered Mathematics only; 12 offered Statistics only; 8 **[6]** offered Physics only; 40 offered Physics and Mathematics ; 20 offered Physics and Statistics; 10 offered Mathematics and Statistics; 65 offered Physics. Find the number of students who (i) offered Mathematics (ii) offered statistics (iii) did not offer any of the above three subjects.

18. Let R be a relation on $N \times N$, defined by (a, b) R (c, d) $\Leftrightarrow$ a + d = b + c for all (a, b), (c, d) **[6]** $\in N \times N$. Show that R is an equivalence relation.

ATOMIC ENERGY CENTRAL SCHOOL NO.4 RAWATBHATA

MCQ Examination August (2020-2021)

CLASS 11 - PHYSICS

Descriptive Type Test-1 (2020-21)

Time Allowed: 1 hour and 30 minutes   **Maximum Marks: 35**

Section A

1. Resolution is **[1]**

   a) a measure of the bias in the instrument

   b) the smallest amount of input signal change that the instrument can detect reliably

   c) a measure of the systematic errors

   d) None of these

2. The number of significant digits in 900.06 is **[1]**

   a) 4

   b) 1

   c) 3

   d) 5

3. The length, breadth and thickness of a rectangular sheet of metal are 4.234 m, 1.005 m, and 2.01 cm respectively. Give the volume of the sheet to correct significant figures. **[1]**

   a) 0.1855 m^3

   b) 0.0755 m^3

   c) 0.08552 m^3

   d) 0.0855 m^3

4. A student measures the thickness of a human hair by looking at it through a microscope of magnification 100. He makes 20 observations and finds that the average width of the hair in the field of view of the microscope is 3.5 mm. What is the estimate on the thickness of hair? **[1]**

   OR

   The radius of the atom is of the order of $2\overset{\text{o}}{\text{A}}$ and radius of a nucleus is of the order of a fermi. How many magnitudes higher is the volume of the atom as compared to the volume of the nucleus?

5. Fill in the blanks: **[1]**

   The standard amount of a physical quantity chosen to measure the physical quantity of same kind is called a _____.

6. Instantaneous velocity or simply velocity v at an instant t equals **[1]**

   a) $\lim\limits_{t \to 0} \frac{\Delta x}{\Delta t}$

   b) $\lim\limits_{t \to \infty} \frac{\Delta x}{\Delta t}$

   c) $\lim\limits_{t \to 0} \frac{\Delta x}{2\Delta t}$

   d) $\lim\limits_{t \to 1} \frac{\Delta x}{\Delta t}$

7. A jet lands on an aircraft carrier at 30 m/s. What is its acceleration if it stops in 2.0 s? **[1]**

   a) 20 ms^{-2}

   b) -20 ms^{-2}

   c) -15 ms^{-2}

   d) -10 ms^{-2}

8. A drag racer starts her car from rest and accelerates at 10.0 m/s^2 for the entire distance of 400 m.How long did it take the race car to travel this distance in seconds? **[1]**
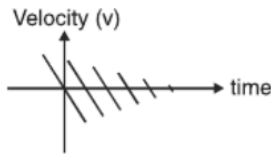
a) 9.01   b) 8.33

c) 10.2   d) 8.94

9. Find the acceleration and velocity of a ball at the instant it reaches its highest point if it was **[1]** thrown up with velocity v.

OR

Suggest a suitable physical situation for the following graph.

10. Fill in the blanks: **[1]**

Acceleration is 9.8 ms^{-2} (downwards) and velocity is _____ at the highest point if a ball was thrown up with velocity v.

Section B

11. The wavelength λ associated with a moving particle depends upon its mass m, its velocity v **[2]** and Plank's constant h. Show dimensional relation between them.

12. Each side of a cube is measured to be 7.203 m. What are the total surface area and the volume **[2]** of the cube to appropriate significant figures?

13. A new system of units is proposed in which unit of mass is α kg, unit of length β m and unit of **[2]** time γ s. How much will 5 j measure in this new system?

14. Derive v = u + at, from velocity-time graph. **[2]**

OR

The displacement x of a particle varies with time as x = 4t^2 - 15t + 25. Find the position, velocity and acceleration of the particle at t = 0.

Section C

15. Two resistors of resistances R_1 =(100 ± 3) Ω and R_2 =(200 ± 4)Ω are connected (i) in series, (ii) **[3]** in parallel. Find the equivalent resistance of the (i) series combination (ii) parallel combination.

16. A book with many printing errors contains four different formulas for the displacement y of a **[3]** particle undergoing a certain periodic motion:

i. $y = a\sin\left(\frac{2\pi t}{T}\right)$
ii. $y = \left(\frac{a}{T}\right)\sin\frac{t}{a}$
iii. $y = \left(a\sqrt{2}\right)\left(\sin\frac{2\pi t}{T} + \cos\frac{2\pi t}{T}\right)$

(a = maximum displacement of the particle, v = speed of the particle. T = time-period of motion). Rule out the wrong formulas on dimensional grounds.

17. A physical quantity X is related to four measurable quantities a, b, c and d as follows: **[3]** $X = a^2 b^3 c^{\frac{5}{2}} d^{-2}$. The percentage error in the measurement of a, b, c and d are 1%, 2%, 3% and 4% respectively. What is the percentage error in quantity X? If the value of X calculated on the basis of the above relation is 2.763, to what value should you round off the result?

18. The velocity-displacement graph of a particle is shown in the figure. **[3]**
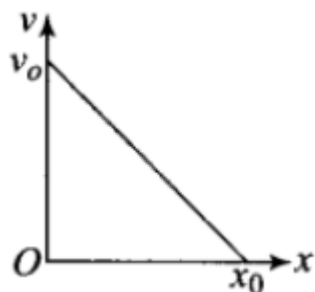
a. Write the relation between v and x.

b. Obtain the relation between acceleration and displacement and plot it.

OR

A particle is moving along a straight line and its position is given by the relation x = (t^3 - $6t^2$ - 15t + 40)m

Find

i. The time at which velocity is zero.

ii. Position & Displacement at this point.

iii. Acceleration for the particle at the point.

Section D

19. A player throws a ball upwards with an initial speed of 29.4 ms.　　　　　　　　**[5]**

i. What is the direction of acceleration during the upward motion of the ball?

ii. What are the velocity and acceleration of the ball at the highest point of its motion?

iii. Choose x = 0 and t = 0 be the location and time at its highest point, vertically downward direction to be the positive direction of x-axis and give the signs of position, velocity, and acceleration of the ball during its upward and downward motion.

iv. To what height does the ball rise and after how long does the ball return to the player's hands? (Take g = 9.8 ms^{-2} and neglect air resistance).

OR

Draw following graphs in your answer sheet :

(a) displacement - time graph for a particle moving with positive velocity and negative acceleration

(b) displacement -time graph for a particle moving negative velocity but positive acceleration.

(c) displacement time graph for a particle moving positive velocity positive acceleration

(d) velocity -time graph for a particle moving positive velocity negative acceleration

(e) velocity -time graph for a particle moving negative velocity and positive acceleration

ATOMIC ENERGY CENTRAL SCHOOL NO.4 RAWATBHATA

CLASS 11 - CHEMISTRY

Online Descriptive Type Test -1(2020-21)

Time Allowed: 1 hour and 30 minutes   **Maximum Marks: 35**

Section A

1. Maximum number of electrons in a subshell with $l = 3$ and $n = 4$ is **[1]**

   a) 14   b) 32

   c) 16   d) 12

2. de-Broglie equation is **[1]**

   a) $\lambda = \frac{hv}{m}$ b) $\lambda = \frac{mv}{h}$

   c) $\lambda = hmv$ d) $\lambda = \frac{h}{mv}$

3. If a cation B^{3+} has 18 electrons, the atomic number of element B will be **[1]**

   a) 12   b) 21

   c) 24   d) 15

4. What is the difference between a quantum and a photon? **[1]**
5. Name the element which does not have any neutron. **[1]**
6. Choose the one out of the following having the highest mass, **[1]**

   a) 3.011×10^{22} atoms of oxygen   b) 1 g atom of C

   c) $\frac{1}{2}$ mole of CH_4 d) 10 mL of water

7. The molarity of NaOH in a solution prepared by dissolving its 4.0 g in enough water to form 250 mL of the solution is, **[1]**

   a) 0.002 M   b) 0.4 M

   c) 0.04M   d) 0.02 M

8. We have to prepare a Litre solution of 0.2 M NaOH from the available 1 M solution. What volume of 1M NaOH is required to be taken ? **[1]**

   a) 2 mL   b) 200 mL

   c) 0.2 mL   d) 20 mL

9. What is one a.m.u. or one 'u'? **[1]**
10. How can you prove that red oxide of copper is not an element? **[1]**

Section B

11. Match the following: **[2]**

Column A	Column B
(a) spherical shape	(i) n-1

(b) number of nodes in p-subshell	(ii) p-orbital
(c) dumb-bell shape	(iii) n-2
(d) number of nodes in s-subshell	(iv) s- orbital

12. Give the mathematical expression of uncertainty principle. **[2]**

<p style="text-align:center">OR</p>

An electron is in one of the 3d orbitals. Give the possible values of n, l and m, electron.

13. Give one example each of a molecule in which empirical formula and molecular formula are (i) same (ii) different. **[2]**

14. The cost of table salt (NaCI) and table sugar ($C_{12}H_{22}O_{11}$) is Rs. 2 per kg and Rs. 6 per kg, respectively. Calculate their costs per mol. **[2]**

<p style="text-align:center">**Section C**</p>

15. Calculate the energy required for the process: **[3]**

He^+ (g) $\longrightarrow$ He^{2+} (g) + e^-
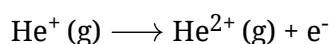
The ionization energy for the H atom in the ground state is 2.18×10^{-18} J atom.

16. Emission transitions in the Paschen series end at orbit n = 3 and start from orbit n can be represented as v = 3.29×10^{15} (Hz) $[1/n^2]$. Calculate the value of n if the transition is observed at 1285 nm. Find the region of the spectrum. **[3]**

17. A flask P contains 0.5 mole of oxygen gas. Another flask Q contains 0.4 mole of ozone gas. Which of the two flasks contains greater number of oxygen atoms? **[3]**

18. Hydrogen gas is prepared in the laboratory by reacting dilute HCl with granulated zinc. Following reaction takes place. **[3]**

Zn + 2HCl $\rightarrow$ ZnCl$_2$+ H$_2$
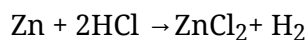
Calculate the volume of hydrogen gas liberated at STP when 32.65 g of zinc reacts with HCl. 1 mol of a gas occupies 22.7 L volume at STP; atomic mass of Zn = 65.3 u.

<p style="text-align:center">OR</p>

Commercially available concentrated hydrochloric acid(HCl) contains 38% HCI by mass.

 i. What is the molarity (M) of the solution (density of solution = 1.19 g mL^{-1})

 ii. What volume required of concentrated HCI is required to make 1.0 L of an 0.10M HCI?

<p style="text-align:center">**Section D**</p>

19. a.   i. An atomic orbital has n = 3. What are the possible values of I and m_I? **[5]**

   ii. List the quantum numbers (mI and I) of electrons for 3d orbital.

   iii. Which of the following orbitals are possible?

   1p, 2s, 2p and 3f

 b. An atom of an element contains 29 electrons and 35 neutrons. Deduce

   i. The number of protons and

   ii. The electronic configurations of the element

<p style="text-align:center">OR</p>

Using Aufbau principle, write the ground state electronic configuration of following atoms.

 i. Boron (Z = 5)

 ii. Neon (Z = 10),

iii. Aluminium (Z = 13)

iv. Chlorine (Z = 17),

v. Calcium (Z = 20)

vi. Rubidium (Z = 37)

ATOMIC ENERGY CENTRAL SCHOOL NO.4 RAWATBHATA

MCQ Examination August (2020-2021)

CLASS 11 - BIOLOGY
BIOLOGY

Time Allowed: 1 hour and 30 minutes   **Maximum Marks: 35**

Section A

1. Fill in the blanks: **[1]**

   a) _____ is the type of animal nutrition where the animal ingests whole or part of plant and animal food, that is later digested and absorbed.

2. How are lichens related to air pollution? **[1]**

3. Food is stored as Floridean starch in Rhodophyceae. Mannitol is the reserve food material of which group of algae? **[1]**

4. Protonema stage is found in which type of plants? **[1]**

5. What is the name of pigments present in Chlorophyceae? **[1]**

Section B

6. Suppose you accidentally find an old preserved permanent slide without a label. In your effort to identify it, you place the slide under microscope and observe the following features : **[2]**

   i. Unicellular

   ii. Well defined nucleus

   iii. Biflagellate–one flagellum lying longitudinally and the other transversely.

   What would you identify it as? Can you name the kingdom it belongs to?

7. Write any two differences between Phycomycetes and Ascomycetes. **[2]**

8. Write the names of three diseases caused by fungi. **[2]**

9. What is the general structure of Pteridophytes? **[2]**

10. Write short notes on: Importance of Gymnosperms **[2]**

Section C

11. List out the differences between Monera and Protista. **[3]**

12. Describe briefly the four major groups of protozoa. **[3]**

13. Give a brief account of viruses with respect to their structure and nature of genetic material. Also name four common viral diseases. **[3]**

14. What features have led to the dominance of vascular plants? **[3]**

15. Distinguish between Red, Brown and Green Algae. **[3]**

Section D

16. How are the male and female gametophytes of pteridophytes and gymnosperms different from each other? **[5]**

ATOMIC ENERGY CENTRAL SCHOOL NO.4,RAWATBHATA

DESCRIPTIVE TYPE TEST-1

CLASS-11TH

SUB-PHYSICAL EDUCATION

TIME:90 min   **M.M-35**

INSTRUCTIONS

1.All questions are compulsory.

2.Q.NO.1 to Q.NO.8 is 1 marks.

3.Q.NO.9 to Q.NO.12 is 3 marks.

4.Q.NO.13 to Q.NO.15 is 5 marks.

Q.1.When was the Khelo India school games started?

Q.2.Write the full form of BCCI.

Q.3.When was the Ancient Olympic Games started?

Q.4.Who has started Modern Olympic Games?

Q.5.When was the first Paralympic Winter Games started?

Q.6.What is mean of ALTIUS ?

 Q.7.How many types of Flexibility?

Q.8.How many types of STRENGTH?

Q.9.Define physical education.

Q.10.Define Khelo India Programme.

Q.11.Define Olympic movement.

Q.12.What do you mean by physical fitness and wellness?

Q.13.What is the objectives of physical education?

Q.14.What is IOC and IOA? How does it work?

Q.15.Explain components of physical fitness.

Solution

Class 11 - Mathematics

Mathematics

Section A

1. **(c)** A
   Explanation: The set is {a, e, i, o, u}

2. **(b)** 45
   Explanation: Let U denote the set of students of the class and let M and P denote the sets of students who passed in mathematics and physics respectively. Then
   n(U) = 100, n(M) = 55 and n(P) = 67
   Since all the students have passed in any of these subjects, we have
   n(U) = 100 $\Rightarrow$ n(M $\cup$ P) = 100
   Now we have, n(M $\cup$ P) = n(M) + n(P) - n(M $\cap$ P)
   $\Rightarrow$ 100 = 55 + 67 - n(M $\cap$ P)
   $\Rightarrow$ n(M $\cap$ P) = 122 - 100 = 22
   Which means the number of students who passed in both the subjects = 22
   Hence the number of students who passed only in physics = n(P) - n(M $\cap$ P) = 67 - 22 = 45

3. **(a)** 63
   Explanation: 63

   The no. of proper subsets = 2^n - 1
   Here n(A) = 6
   In case of the proper subset, the set itself is excluded that's why the no. of the subset is 63. But if it is asked no. of improper or just no. of subset then you may write 64
   So no. of proper subsets = 63

4. **(c)** R = {(x, y) : 0 < x < a, 0 < y < b}
   Explanation: We have, R be set of points inside a rectangle of sides a and b
   Since, a, b > 1
   a and b cannot be equal to 0
   Thus, R = {(x, y) : 0 < x < a, 0 < y < b}

5. **(a)** {2, 3, 5, 7}
   Explanation: Prime no. less then 10 is 2, 3, 5, 7 so
   Set A = {2, 3, 5, 7}

6. **(c)** $\left\{-\frac{1}{2}\right\}$
   Explanation: $f : [-2, 2] \to R$ is defined by
   $f(x) = \begin{cases} -1, & -2 \leqslant x \leqslant 2 \\ x-1, & 0 \leqslant x \leqslant 2 \end{cases}$
   Let $x \leqslant 0$ and $f(|x|) = x$
   Now, $f(|x|) = x \Rightarrow |x| - 1 = x$
   $\Rightarrow -x - 1 = x \ [\because |x| \geqslant 0]$
   $\Rightarrow -x - 1 = x \ (\text{as } x \leqslant 0)$
   $\Rightarrow 2x = -1 \Rightarrow x = -\frac{1}{2}$
   $\therefore \{x \in [-2, 2] : x \leqslant 0 \text{ and } f(|x| = x\} = \left\{-\frac{1}{2}\right\}$

7. **(a)** [-1, 1/3]
   Explanation: we know, $-1 \leq \cos x \leq 1$
   $-2 \leq -2\cos x \leq 2$
   $-1 \leq (1 - 2\cos x) \leq 3$

$-1 \leq \left(\frac{1}{1-2\cos x}\right) \leq \frac{1}{3}$

So, R(f) = [-1, 1/3]

8. **(d)** $\frac{1}{16}\left(-\frac{3}{x} + 5x - 6\right)$

Explanation: $3f(x) + 5f\left(\frac{1}{x}\right) = \frac{1}{x} - 3$ ... (1)

Replacing x by 1/x;

$3f\left(\frac{1}{x}\right) + 5f(x)$ = x - 3 ... (2)

Multiply eqn 1 by 3 and eqn 2 by 5 and then subtract them

We get,

$-16f(x) = \frac{3}{x} - 5x + 6$

$f(x) = \frac{1}{16}\left(-\frac{3}{x} + 5x - 6\right)$

9. **(b)** [3 /4 ,1]

Explanation: f (x) = sin^4 x +1 - sin ^{2} x

$f(x) = \sin^4 x - \sin^2 x + \frac{1}{4} - \frac{1}{4} + 1$

$f(x) = \left(\sin^2 x - \frac{1}{2}\right)^2 + \frac{3}{4}$

$\left(\sin^2 x - \frac{1}{2}\right)^2 \geq 0$

Minimum value of f(x) = 3/4

$0 < \sin^2 x < 1$

So, maximum value of f(x) = $\left(1 - \frac{1}{2}\right)^2 + \frac{3}{4}$

$= \frac{1}{4} + \frac{3}{4}$

= 1

R(f) =[3/4,1]

10. **(b)** 21

Explanation: Since A, B, C are disjoint

$\therefore n(A \cup B \cup C)$ = n(a) + n(B) + n(C)

= 10 + 6 + 5 = 21

Section B

11. Here A = {a, b} and B = {a, b, c} All elements of set A are present in set B

$\therefore A \subset B$, Now $A \cup B = \{a,b,c\} = B$

12. Here,it is given that n(A) = 54, n(B) = 39, n(B - A) = 13

Using the hint: n(B) = n(B - A) + n(A ∩ B)

$\Rightarrow$ 39 = 13 + n(A ∩ B)

$\Rightarrow$ n(A ∩ B) = 39 - 13

$\Rightarrow$ n(A ∩ B) = 26
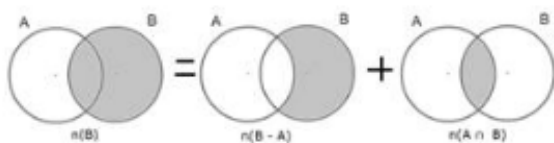
We know that n(A $\cup$ B) = n(A) + n(B) - n(A ∩ B)

$\Rightarrow$ n(A $\cup$ B) = 54 + 39 – 26

$\Rightarrow$ n(A $\cup$ B) = 67

Therefore, n(A $\cup$ B) = 67

13. Given, f: R→R defined by f(x) = x + 10

Here; at $x = 0, f(0) = 10$

at $x = 1, f(1) = 11$

at $x = 2, f(2) = 12$

... ...

at x = 10, f(10) = 20 and so on

Also, at $x = -1, f(-1) = 9$

at x = -2, f(-2) = 8

at x = -10, f(-10) = 0 and so on.

Section C

14. Let M, P and C denote the students studying Mathematics, Physics and Chemistry, respectively.

   Then, we have,

   n (U) = 200, n (M) =120, n (P) =90, n (C) = 70,

   n(M∩P) = 40, n(P∩C) = 30, n(M ∩ C) = 50 and

   n $(M \cup P \cup C)'$ = 20

   Now, $n(M \cup P \cup C)' = n(U) - n(M \cup P \cup C)$

   20 = 200 - n(M $\cup$ P $\cup$ C)

   n(M $\cup$ P $\cup$ C) = 200 - 20 = 180

   We know that, n (M $\cup$ P$\cup$ C) = n (M) + n (P) + n (C) - n(M $\cap$ P) - n (P $\cap$ C) - n (C $\cap$ M) + n(M $\cap$ C $\cap$P)

   ∴. 180 = 120 + 90 + 70 - 40 - 30 - 50 + n(M $\cap$ C $\cap$ P)

   ⇒180 = 280 - 120 + n (M $\cap$ C $\cap$P)

   ⇒180 + 120 - 280 = n(M $\cap$ C $\cap$ P)

   ∴.n (M $\cap$ C $\cap$P) = 300 - 280 = 20

   Hence, 20 students study all the three subjects.

15. Here we have, $A \times B \subseteq C \times D$ and $A \times B \neq \phi$

   To prove: $A \subseteq C$ and $B \subseteq D$

   Let us consider, $(x, y) \in (A \times B)$ ....(i)

   $\Rightarrow (x, y) \in (C \times D)$ [as $A \times B \subseteq C \times D$] ....(ii)

   From (i) we can say that,

   x $\in$ A and y $\in$ B ....(iii)

   From (ii) we can say that,

   x $\in$ C and y $\in$ D ....(iv)

   Comparing (iii) and (iv) we can say that,

   ⇒ x $\in$ A and A $\in$ C

   $\Rightarrow A \subseteq C$

   Again,

   ⇒ y $\in$ B and y $\in$ D

   $\Rightarrow B \subseteq D$

   Hence proved.

16. Here we have, f(x) = 2 for all x $\in$ R

   Then, dom (f) = R and range (f) = {2}.

   Now we make the table of above function,

X	-2	-1	0	1	2	3
f(x) = 2	2	2	2	2	2	2

   On a graph paper, we draw X' OX arid YOY' as the x-axis and the y-axis respectively.

   Taking the scale: 10 small divisions = 1 unit.

   On this graph paper, we plot the points A(-2, 2), B(-1, 2), C(0, 2), D(1, 2), E(2, 2) and F(3, 2). Join A, B, C, D, E and F

   successively to obtain the required graph line ABCDEF, whose

   equation is y = 2
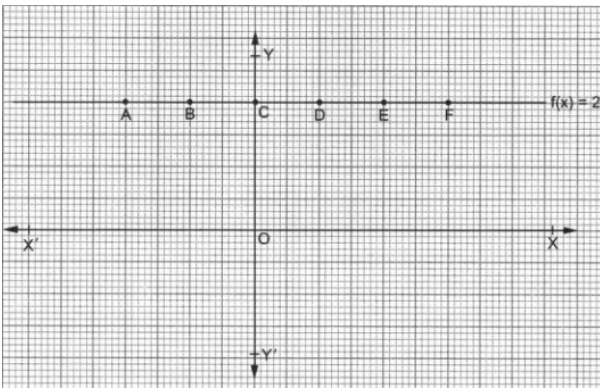
Graph of the function, f(x) = 2

Section D

17. Let M, S and P be the sets of students who offered Mathematics, Statistics and Physics respectively. Let x be the number of students who offered all the three subjects.

Given: n(U) = 100, No. of students offered only Mathematics = 15, No. of students who offered only Statistics = 12, No. of students who offered only Physics = 8,

n (P ∩ M) = 40, n (P ∩ S) = 20, n (M ∩ S) = 10, n(P) = 65

It is given that 10 students offered Mathematics and Statistics. Therefore, number of students who offered Mathematics and Statistics but not Physics is 10 - x. Similarly, number of students who offered Statistics and Physics but not Mathematics is 20 - x and number of students who offered Mathematics and Physics but not Statistics is 40 - x. The Venn diagram is shown in figure.
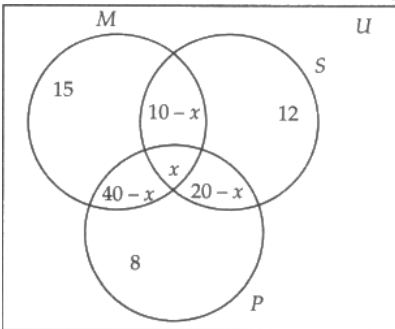
It is given that 65 students offered Physics.

So, (40 - x) + x + (20 - x) + 8 = 65

$\Rightarrow$ 68 - x = 65

$\Rightarrow$ x = 3

   i. The number of students who offered Mathematics, n(M) = 15 + (10 - x) + x + (40 - x) = 65 - x = 65 - 3 = 62

  ii. The number of students who offered Statistics, n(S) = 12 + (10 - x) + x + (20 - x) = 42 - x = 42 - 3 = 39

 iii. The number of students who offered any of three subjects, n(M $\cup$ S $\cup$ P)

    = 15 + 12 + 8 + (10 - x) + (40 - x) + (20 - x) + x

    = 105 - 2x

    = 105 - 2 $\times$ 3 = 99

    $\therefore$ Number of students who did not offer any of the three subjects = n(U) - n(M $\cup$ S $\cup$ P) = 100 - 99 = 1

18. Here R is a relation on $N \times N$, defined by (a, b) R (c, d) $\Leftrightarrow$ a + d = b + c for all (a, b), (c, d) $\in N \times N$

We shall show that R satisfies the following properties

   i. Reflexivity:

    We know that a + b = b + a for all a, b $\in$ N.

    $\therefore$ (a, b) R (a, b) for all (a, b) $\in (N \times N)$

    So, R is reflexive.

  ii. Symmetry:

    Let (a, b) R (c, d). Then,

    (a, b) R (c, d) $\Rightarrow$ a + d = b + c

    $\Rightarrow$ c + b = d + a

    $\Rightarrow$ (c, d) R (a, b).

    $\therefore$ (a, b) R (c, d) $\Rightarrow$ (c, d) R (a, b) for all (a, b), (c, d) $\in N \times N$

    This shows that R is symmetric.

iii. Transitivity:

Let (a, b) R (c, d) and (c, d) R (e, f). Then,

(a, b) R (c, d) and (c, d) R (e, f)

$\Rightarrow$ a + d = b + c and c + f = d + e

$\Rightarrow$ a + d + c + f = b + c + d + e

$\Rightarrow$ a + f = b + e

$\Rightarrow$ (a, b) R (e, f).

Thus, (a, b) R (c, d) and (c, d) R (e, f) $\Rightarrow$ (a, b) R (e, f)

This shows that R is transitive.

$\therefore$ R is reflexive, symmetric and transitive

Hence, R is an equivalence relation on $N \times N$

Section A

1. **(b)** the smallest amount of input signal change that the instrument can detect reliably
   Explanation: Resolution is the smallest amount of input signal change that the instrument can detect reliably.

2. **(d)** 5
   Explanation: There are three rules on determining how many significant figures are in a number:
   - Non-zero digits are always significant.
   - Any zeros between two significant digits are significant.
   - A final zero or trailing zeros in the decimal portion ONLY are significant.

   Keeping these rules in mind, we can say that there are 5 significant digits.

3. **(d)** 0.0855 m^3
   Explanation: length of sheet, l = 4.234 m
   breadth of sheet, b = 1.005 m
   thickness of sheet, t = 2.01 cm = 2.01 × 10^{-2} m
   volume = l × b × t
   $\Rightarrow$ V = 4.234 × 1.005 × 0.0201 = 0.0855289 = 0.0855 m^3 (This number has only 3 significant figures i.e., 8, 5, and 5)

4. Magnification of the microscope = 100
   Average width of the hair in the field of view of the microscope = 3.5 mm
   $\therefore$ Actual thickness of the hair is $= \frac{3.5}{100}$ = 0.035 mm.

   <div align="center">OR</div>

   Given that the Radius of an atom, (R_{Atom}) is 2$\overset{o}{A}$ = 2 × 10^{-10} m and the radius of a nucleus, ($R_{Nucleus}$) is 1 fermi = 10^{-15} m

   Volume of an atom, V_{Atom} = $\frac{4}{3}\pi R^3_{Atom}$

   Volume of a nucleus, $V_{Nucleus}$ = $\frac{4}{3}\pi R^3_{Nucleus}$

   $\frac{V_{Atom}}{V_{Nuclues}} = \frac{\frac{4}{3}\pi R^3_{Atom}}{\frac{4}{3}\pi R^3_{Nucleus}} = \left[\frac{R_{Atom}}{R_{Nucleus}}\right]^3 = \left[\frac{2\times10^{-10}}{10^{-15}}\right]^3$ = 8 ×10^{15}.

   Volume of an atom is roughly 10^{16} times more than that of nucleus, therefore most of the atom is free (empty space) and nucleus is heavy and dense as per Rutherford's observation.

5. Physical unit

6. **(a)** $\lim\limits_{t\to0} \frac{\Delta x}{\Delta t}$
   Explanation: Instantaneous velocity is the velocity of an object in motion at a specific point in time. This is determined similarly to average velocity, but we narrow the period of time so that it approaches zero. The formula for instantaneous velocity is the limit as t approaches zero of the change in position over the change in t. Mathematically,
   $\lim\limits_{t\to0} \frac{\Delta x}{\Delta t}$
   The Instantaneous Velocity is expressed in m/s.

7. **(c)** -15 ms^{-2}
   Explanation: Initial velocity, u = 30 m/s
   As it stops then final velocity v = 0 m/s
   Time taken t = 2.0 s
   We know, v - u = at
   $\Rightarrow$ 0 - 30= 2a

$\Rightarrow$ a = $\frac{-30}{2}$ = $-15\ m/s^2$

$-$ve sign shows velocity is decreasing.

8. **(d)** 8.94

   Explanation: Initial velocity u = 0

   Acceleration a = 10.0 m/s^2

   Distance covered s = 400 m

   Time is taken, t = ?

   We know

   $s = ut + \frac{1}{2}at^2$

   $\Rightarrow 400 = 0 \times t + \frac{1}{2} \times 10 \times t^2$

   $\Rightarrow$ 400 = 5t^2

   $\Rightarrow$ t^2 = 80

   $\Rightarrow$ t = $\sqrt{80}$ = 8.94 s

9. At the highest point acceleration is equal to 9.8 m/s^2 (downwards) and velocity is zero at the same point.

   OR

   The velocity-time graph represents the motion of a ball thrown up with some initial velocity, it hits the ground and gets rebounded with a reduced speed. It goes on hitting the ground and after each hit its speed decreases unit it becomes zero and the ball comes to rest finally.

10. zero

Section B

11. It is given that wavelength λ associated with a moving particle depends upon mass m, velocity v and Plank's constant (h).

    Let, λ = km^{a}v^{b}h^c ....(1)

    where k is a dimensional constant.

    Writing dimensions of various terms, we get

    [M^{0}L^{1}T^0] = [M]^a [LT^{-1}]^b[ML^{2}T^{-1}]^c

    [M^{0}L^{1}T^0] = M^{a+c}L^{b+2c}T^{-b-c}

    Using homogeneity rule and comparing dimensions of M,L and T we have

    a + c = 0, b + 2c = 1, -b-c = 0

    Solving, we get a = -1, b = -1, c = +1 putting these values in equation (1) we get

    λ = $\frac{kh}{mv}$

12. Here it is given that, Side of the cube = 7.203 m

    Therefore, Total Surface area = $6 \times (\ side\ )^2 = 6 \times (7.203)^2$

    = 311.299254 m^2

    = 311.3 m^2 [where the value has been rounded off to 4 significant figures]

    Now, Volume of the cube = (side)^3 = (7.203)^3

    = 373.714754 m^3

    = 373.7 m^3 [Rounded off to 4 significant figures]

13. We know that dimension of energy = [ML^{2}T^{-2}]

    Now let $n_1 =$ value of energy in SI unit system

    $n_2 =$ numerical value of energy in given unit system

    Let $M_1 =$ basic unit of mass in SI unit system

    $M_2 =$ basic unit of mass in given unit system

    $L_1 =$ basic unit of length in SI unit system

    $L_2 =$ basic unit of length in given system

    $T_1 =$ basic unit of time in SI unit system

    $T_2 =$ basic unit of time in given unit system

    Then, we have

    $n_2 = n_1 \left[\frac{M_1}{M_2}\right]^1 \left[\frac{L_1}{L_2}\right]^2 \left[\frac{T_1}{T_2}\right]^{-2}$

$M_2 = \alpha$ kg , M_1 = 1 Kg

$L_2 = \beta$ m , L_1 = 1 m

$T_2 = \gamma$ s , T_1 = 1 second

$n_2 = n_1 \left(\frac{M_1}{M_2}\right)^1 \left(\frac{L_1}{L_2}\right)^2 \left(\frac{T_1}{T_2}\right)^{-2} = n_1 \left(\frac{1}{\alpha}\right)^1 \left(\frac{1}{\beta}\right)^2 \left(\frac{1}{\lambda}\right)^{-2} = \frac{n_1\lambda^2}{\alpha\beta^2} = \frac{5\lambda^2}{\alpha\beta^2}$

This is the required value of energy in the new system of units.

14. From the below graph, v = final velocity of the particle, u = initial velocity of the particle, a = acceleration of the particle.

Slope of v-t graph is given by:

$\tan\theta = \frac{v-\nu}{t}$

Again, acceleration a = slope of v-t graph.

Hence, $\tan\theta$ = acceleration (a)

$\therefore a = \frac{v-u}{t}$

$\Rightarrow v - u = at$

$\therefore v = u + at$
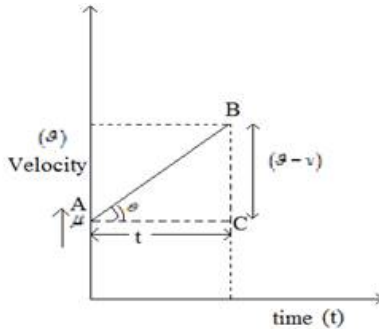
OR

Let us assume S.I units are to be used

Position, x = ($4t^2$ -15t + 25) m

At t = 0, x = 25 m

Now, $velocity = \frac{dx}{dt} = 8t - 15$

At $t = 0, v = 0 - 15 = -15$m/s

Acceleration, a = $\frac{dv}{dt} = 8ms^{-2}$

Section C

15. Here, R_1 = (100 ± 3) Ω, R_2 = (200 ± 4) Ω

   i. **Resistance in Series combination**

   R = R_1 + R_2 = 100 + 200 = 300 Ω

   ΔR = ± $(\Delta R_1 + \Delta R_2)$

   = ±(3 + 4) = ± 7 Ω

   $\therefore \quad R = (300 \pm 7)\Omega$

   ii. **Resistance in Parallel Combination**

   $\frac{1}{R'} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{R_2+R_1}{R_1R_2} = \frac{200+100}{100\times200} = \frac{300}{20000} = \frac{3}{200}$

   $R' = \frac{200}{3}$ = 66.66667 = 66.7Ω [upto one decimal place]

   $\frac{\Delta R'}{R'^2} = \pm \left[\frac{\Delta R_1}{R_1^2} + \frac{\Delta R_2}{R_2^2}\right]$

   $\Delta R' = \pm \left[\Delta R_1 \left(\frac{R'}{R_1}\right)^2 + \Delta R_2 \left(\frac{R'}{R_2}\right)^2\right]$

   $= \pm \left[3\left(\frac{200}{3\times100}\right)^2 + 4\left(\frac{200}{3\times200}\right)^2\right] = \pm \left[3\left(\frac{4}{9}\right) + 4\left(\frac{1}{3}\right)\right] = \pm 1.8$ Ω

   Hence, the equivalent resistance along with error in parallel combination is = (66.7 ± 1.8) Ω

16.   a. The given equation is:

   $y = a\sin\frac{2\pi t}{T}$

   Dimension of y = $M^0L^1T^0$

Dimension of a = $M^0L^1T^0$

Dimension of $\sin\frac{2\pi t}{T} = M^0L^0T^0$

$\because$ Dimension of L.H.S = Dimension of R.H.S

Hence, the given formula is dimensionally correct.

b. The given equation is:

$y = \left(\frac{a}{T}\right)\sin\left(\frac{t}{a}\right)$

Dimension of y = $M^0L^1T^0$

Dimension of $\frac{a}{T} = M^0L^1T^{-1}$

Dimension of $\frac{t}{a} = M^0L^{-1}T^l$

But the argument of the trigonometric function must be dimensionless, which is not so in the given case.

Hence, the formula is dimensionally incorrect.

c. The given equation is:

$y = \left(a\sqrt{2}\right)\left(\sin 2\pi\frac{t}{T} + \cos 2\pi\frac{t}{T}\right)$

Dimension of y = $M^0L^1T^0$

Dimension of a = $M^0L^1T^0$

Dimension of $\frac{t}{T} = M^0I^0T^0$

Since the argument of the trigonometric function must be dimensionless (which is true in the given case), the dimensions of y and a are the same. Hence, the given formula is dimensionally correct.

17. Given physical quantity is $X = a^2b^3c^{\frac{5}{2}}d^{-2}$

Maximum percentage error in X is:

$\frac{\Delta X}{X} \times 100 = \pm\left[2\frac{\Delta a}{a} + 3\frac{\Delta b}{b} + \frac{5}{2}\frac{\Delta c}{c} + 2\frac{\Delta d}{d}\right] \times 100$

$\frac{\Delta x}{x} \times 100 = \pm\left[\frac{2\times 1}{100} + \frac{3\times 2}{100} + \frac{5}{2}\times\frac{3}{100} + \frac{2\times 4}{100}\right]100$

$= \pm\frac{100}{100}\left[2 + 6 + \frac{15}{2} + 8\right]$

$\frac{\Delta X}{X} \times 100 = \pm\left[16 + \frac{15}{2}\right] = \pm\left[\frac{32+15}{2}\right] = \pm\frac{47}{2} = \pm 23.5\%$

Mean absolute error = $\pm\frac{23.5}{100} = \pm 0.235$

= 0.24 (rounding off in significant figure)

The calculated value of X = 2.763 should be round-off up to two significant digits i.e, X = 2.8.

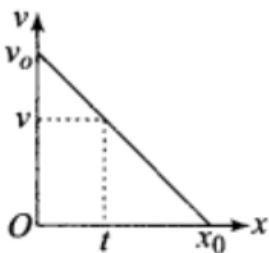18. In this question, we will use the equation of the straight line graph (linear equation).

y = mx + c.

In this equation, m is the slope of the graph and c is the interception on the y-axis.

Now according to the problem, initial velocity $= v_0$

Let the distance traveled in time $t = x_0$.

For the graph, $\tan\theta = \frac{v_0}{x_0} = \frac{v_0-v}{x}$ ....(i)

Where, v is velocity and x is displacement at any instant of time t.

From Equation (i), we have

$v_0 - v = \frac{v_0}{x_0}x$

$\Rightarrow \quad v = \frac{-v_0}{x_0}x + v_0$

We know that,

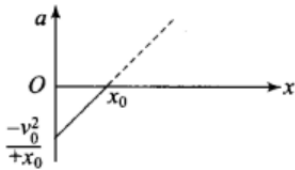Acceleration, $a = \frac{dv}{dt} = \frac{-v_0}{x_0}\frac{dx}{dt} + 0$

$\Rightarrow \quad a = \frac{-v_0}{x_0}(v)$

$$= \frac{-v_0}{x_0}\left(\frac{-v_0}{x_0}x + v_0\right) = \frac{v_0^2}{x_0^2}x - \frac{v_0^2}{x_0} \quad \text{........(ii)}$$

On comparing the equation (ii) with equation of a straight line y = mx + c we have

$$m = \frac{v_0^2}{x_0^2} = +ve, \quad c = -\frac{v_0^2}{x_0^2}$$

Graph of 'a' versus x is given below.

<div align="center">OR</div>

The given equation is x = t^3 - 6t^2 - 15t + 40

$$\therefore \ v = \frac{dx}{dt} = \left(3t^2 - 12t - 15\right) m/s$$

and $a = \frac{dv}{dt} = (6t - 12)m/s^2$

i) Since , v = 0

3t^2 - 12t - 15 = 0

3t^2 - 15t + 3t - 15 = 0

3t(t - 5) + 3(t - 5) = 0

(3t + 3)(t - 5) = 0

Either t = -1 or t = 5

Time cannot be negative

$\therefore$ t = 5 seconds.

ii) Position at t = 5 s

x = (5)^3 - 6(5)^2 - 15(5) + 40

x = - 60m

At t = 0 s,

x = (0)^3 - 6x(0)^2 - 15x0 + 40 = 40 m

The displacement between t = 0 sec to t = 5 sec is given by:

S = Final Position (x$_5$) - Initial Position (x$_0$)

where x$_5$ = - 60m and x$_0$ = 40m

s = - 60 - 40

s = -100 m

iii) Acceleration at t = 5s

a = 6t - 12

a = 6(5) - 12

a = (30 - 12)

a = 18 m/s^2

<div align="center">**Section D**</div>

19. i. Irrespective of the direction of motion of the ball, acceleration (which is actually acceleration due to gravity) always act in the downward direction towards the centre of the earth.

    ii. At the highest point, the velocity of the ball becomes zero and acceleration is equal to the acceleration due to gravity = 9.8 ms^{-2} in vertically downward direction.

    iii. When the highest point is chosen as the location for x = 0 and t = 0 and vertically downward direction to be the positive direction of x-axis and upward direction as negative direction of x-axis.
    During upward motion, sign of position is negative, sign of velocity is negative and sign of acceieration is positive. During downward motion, sign of position is positive, sign of velocity is positive and sign of acceleration is also positive.

    iv. Taking vertical upward motion of the ball, we have
    u = - 29.4 ms^{-1}, a = 9.8 ms^{-2}, v = 0, s = S, t = ? (where t be the time taken by the ball to reach the highest point where height from ground be s)

As, $v^2 - u^2$ = 2as or $v^2 - u^2$ = 2gs

$\therefore 0 - (-29.4)^2 = 2 \times 9.8 \times S$

or S = $\frac{-(29.4)^2}{2 \times 9.8}$ = - 44.1 m

where negative sign shows that the distance is covered in upward direction.

Also we know that, v = u + at

$\therefore 0 = -29.4 + 9.8 \times t$ or $t = \frac{29.4}{9.8} = 3$s

It means time of ascent = 3 seconds

Since the time of ascent is always equal to the time of descent when an object moves under the effect of gravity alone.

Hence, total time after which the ball returns to the player's hand = 3 + 3 = 6 seconds

OR

as per ncert

Class 11 - Chemistry

Online Descriptive Type Test -1(2020-21)

Section A

1. **(a)** 14

   Explanation: Here l = 3 means the sub shell is f and
   n = 4 means it is present in 4th orbit. Finally it is a 4f sub shell.
   The no of orbital in f sub shell = $2l + 1 = 2 \times 3 + 1 = 7$
   Each orbital can accommodate 2 electrons. $7 \times 2 = 14$ electrons.
   Maximum number of electrons in a sub shell with l=3 and n=4 (4f) is 14 electrons.

2. **(d)** $\lambda = \frac{h}{mv}$

   Explanation: Louis de-Broglie proposed that matter, like light, has a dual character. It exhibits wave as well as particle nature. The wavelength of the wave associated with a particle of mass m moving with velocity v is given by
   $\lambda = \frac{h}{mv}$

3. **(b)** 21

   Explanation: In the formation of a cation with 3^+ charges, the atom loses 3 electrons.
   The no. of electrons in the atom will be 18 + 3 = 21.
   In a neutral atom, the no. of protons is equal to the no. of electrons. So atomic no. is 21.

4. The smallest packet of energy of any radiation is called a quantum whereas that of light is called photon. A photon is an elementary particle but quantum can be described as a measure of quantity. It is not considered as an elementary particle.

5. Ordinary Hydrogen has a single proton and no neutrons in its nucleus. That's the only atom with no neutrons. Hydrogen's heavier isotopes have one (deuterium) or two (tritium) neutrons alongside the single proton.

6. **(b)** 1 g atom of C

   Explanation: Calculations & inference :
   1 g atom of C
   1 gm atomic mass of C
   = 12.00 g
   One mole of CH_4
   = gram molar mass of CH_4
   = 16 g
   $\therefore$ mass of $\frac{1}{2}$ mole of CH_4 = 8.0 g
   Mass of 10 ml of water
   = 10 gms
   (since, density of water = 1 gm / ml)
   Mass of 6.022×10^{22} atoms of Oxygen
   Since, 6.022×10^{23} atoms of Oxygen weighs
   = its gm atomic mass (ie.16 g)
   $\therefore$ mass of 3.011×10^{23} atoms of O
   = 8 .0 g.
   $\therefore$ mass of 3.011×10^{22} atoms of O
   = 0.80 g
   Thus, the mass of 1 g atom of Carbon is highest out of the above .

7. **(b)** 0.4 M

   Explanation: Since Molarity = $[\frac{moles\,of\,solute*}{volume\,of\,solution(mL)} \times 1000]M$
   $\therefore$ substituting the given values, we get -

Molarity (M) = $\frac{0.10}{250} \times 1000M$ = 0.4M

* moles of solute ie. NaOH = $\frac{4}{40}$ mole

= 0.1mol

8. **(b)** 200 mL

Explanation: Since ,

total strength of given solution

= total strength of prepared solution

∴ Apply the relation -

M1 x V1 = M2 x V2

where , M1= molarity of solution given= 1.0 M ,

V1 = volume of solution given= ?

& M2= molarity of solution to be prepared = 0.20 M (given)

V2 = volume of solution to be prepared = 1000 mL (given)

Substiuting the given values we get ,

1.00M x V1 = 0.20 ×1000

V1= (0.20 × 1000) / 1.00

V1 = **200 mL**

9. 1 a.m.u. (atomic mass unit) or simply 1 u* is a mass exactly equal to one - twelfth (= $\frac{1}{12}$ th) of the mass of one carbon - 12 atom (ie. ^{12}C) and 1 amu = 1.66056 $\times 10^{24}$ g.

' **amu'** has been replaced by '**u'** which is known as **unified mass.**

10. An element is a substance made up of the same type of atoms while a compound is made up of different elements in fixed ratio by mass.

On heating red oxide of copper in the presence of hydrogen, its mass decreases and it forms shining metallic copper which is chemically different from the original compound.

$Cu_2O + H_2 \rightarrow 2Cu + H_2O$
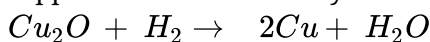
Therefore, Cu_2O is compound not an element.

Section B

11. (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)

12. Mathematically, it can be given as

$\Delta x \times \Delta p_x \geq \frac{h}{4\pi}$

or, $\Delta x \times \Delta (mv_x) \geq \frac{h}{4\pi}$

where Δx is the uncertainty in position, $\Delta p_x (or \Delta mv_x)$ is the uncertainty in the momentum of the particle and h is Planck's constant. The sign means that the product of uncertainties in p and x is either equal to or greater than h.

OR

For electron in 3d orbital, n = 3, l =2 , m1 = -2, -1, 0, +1, +2

13. We know that; Molecular formula = n $\times$(Empirical formula) ; Where, n= Whole number value.

   i. Example of molecules having same molecular formula and empirical formula: Carbon dioxide (CO_2) and Water (H_2O)

  ii. Example of molecules having different molecular formula and empirical formula:

  a) Hydrogen peroxide: molecular formula is H_2O_2 and empirical formula is HO.

  b) Glucose : Molecular formula is ($C_6H_{12}O_6$) and empirical formula is CH_2O.

14. The molar mass of NaCI = 58.5 g

Molar mass of Sugar($C_{12}H_{22}O_{11}$) = 342 g

Given 1000 g of NaCl cost = Rs 2

So the cost of 58.5 g of NaCI i.e., per mol = $\frac{2}{1000} \times 58.5 = Rs.0.117$

Given 1000 g of $C_{12}H_{22}O_{11}$ (Sugar) cost = Rs 6

So the cost of 342 g of $C_{12}H_{22}O_{11}$ (Sugar) i.e., per mol = $\frac{6}{1000} \times 342 = Rs.2.05$

Section C

15. The expression for the ionization energy atom:

$E_n = \frac{2.18 \times 10^{-18} \times Z^2}{n^2}$ J atom^{-1}

For H atom (Z = 1) $E_n = 2.18 \times 10^{-18} \times (1)^2$ J atom^{-1} (given)

For He$^+$ ion (Z = 2) $E_n = 2.18 \times 10^{-18} (2)^2 = 8.72 \times 10^{-18}$ J atom^{-1}

(one electron species)

16. v = $(3.29 \times 10^{15}$ Hz$) \left(\frac{1}{3^2} - \frac{1}{n^2} \right)$

λ = 1285 nm = 1285 $\times 10^{-19}$ m = 1.285 $\times 10^{-16}$ m

v = $\frac{c}{\lambda} = \frac{(3 \times 10^8 \text{ms}^{-1})}{(1.285 \times 10^{-6} \text{m})}$ = 2.3346 $\times 10^{14}$s^{-1}

2.3346 $\times 10^{14}$ = 3.29 $\times 10^{15} \left[\frac{1}{3^2} - \frac{1}{n^2} \right]$

$\frac{2.3346}{32.9} = \frac{1}{3^2} - \frac{1}{n^2}$ or 0.71 = $\frac{1}{9} - \frac{1}{n^2}$

$\frac{1}{n^2} = \frac{1}{9}$ - 0.071 = 0.111 - 0.071 = 0.04

n^2 = $\frac{1}{0.04}$ = 25 or n = 5

Paschen series lies in infrared region of the spectrum.

17. Step 1:

1 molecule of oxygen (O$_2$) contains 2 atoms of oxygen

1 molecule of ozone (O$_3$) contains 3 atoms of oxygen

In flask P:
The number of molecules in 1 mole of oxygen gas
= 69.022 $\times$ 1023 molecules
The number of molecules in 0.5 mole of oxygen gas
= 6.022 $\times$ 10^{23} $\times$ 0.5 molecules
= 6.022 $\times$ 10^{23} $\times$ 0.5 $\times$ 2 atoms, (since O$_2$ is a diatomic gas)

= 6.022 $\times$ 10^{23} atoms, (i)

Step 2:
In flask Q:
The number of molecules 1 mole of ozone gas molecules
= 6.022 x 10^{23} molecules
The number of molecules in 0.4 moles of ozone gas
= 6.022 $\times$ 10^{23} $\times$ 0.4 molecules
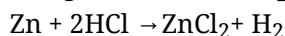The number of oxygen atoms in 0.4 moles of ozone gas
= 6.022 $\times$ 10^{23} $\times$ 0.4 $\times$ 3 atoms, because Ozone (O$_3$) is a triatomic gas)

= 7.23 $\times 10^{23}$ atoms, (ii)

Comparing results in (i) & (ii) we infer that,

$\therefore$ Flask Q has a greater number of oxygen atoms as compared to that of in flask P.

18. The given chemical equation is :

Zn + 2HCl $\rightarrow$ ZnCl$_2$+ H$_2$

Atomic mass of Zn = 65.3u.

65.3g of Zn reacts with HCl to form 22.7 L of H$_2$ (g)

$\therefore$ 32.65 g of Zn at STP reacts with HCl to form = $\frac{22.7 \times 32.65}{65.3} = 11.35 L$ of H$_2$(g)

OR

i. Let assume the total mass of the solution is 100g.

38 % HCl by mass means 38 g of HCl is present in 100 g of solution.

The volume of solution (V) = $\frac{\text{mass}}{\text{density}} = \frac{100}{1.19} = 84.03$mL (Density of solution = 1.19 g/mL)

Number of moles of HCl $(n_B) = \frac{38}{36.5} = 1.04$

Molarity $= \frac{n_B \times 1000}{V(\text{in mL})} = \frac{1.04 \times 1000}{84.03 \text{ mL}} = 12.38$ M

ii. From the molarity equation,
$$M_1 V_1 = M_2 V_2$$
$$\text{acid}_1 \quad \text{acid}_2$$

$12.38\text{M} \times V_1 = 0.10\text{M} \times 1.0\text{L}$

$\therefore V_1 = \frac{0.1 \times 1.0}{12.38} = 0.00808\text{L} = 8.08\text{cm}^3$

Section D

19. a. i. For n = 3, I = 0, 1, 2

When I = 0, m_I = 0

When I = 1, m_I = -1, 0, + 1

When I = 2, m_l = -2, -1, 0, +1, + 2

ii. n =3, I = 2 and for I = -2, -1, 0, +1, +2

iii. 2s, 2p are possible.

b. An atom of an element contains 29 electrons and 35 neutrons

i. No. of protons = 29

ii. Atomic number = 29

Electronic configuration : $[\text{Ar}]^{18} 3d^{10}4s^1$.

OR

i. Boron (Z = 5) $1s^2 2s^2 2p^1$

ii. Neon (Z = 10) $1s^2 2s^2 2p^6$

iii. Aluminium (Z = 13) $1s^2 2s^2 2p^6 3s^2 3p^1$

iv. Chlorine (Z = 17) $1s^2 2s^2 2p^6 3s^2 3p^5$

v. Calcium (Z = 20) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

vi. Rubidium (Z = 37) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 5s^1$

BIOLOGY

Section A

1. Fill in the blanks:

   a) 1. Holozoic Nutrition

2. The decrease in lichen population of an area is indicative of air pollution, particularly SO_2 pollution.

3. Mannitol is the reserve food material in Phaeophyceae or Brown Algae.

4. Mosses

5. Chlorophyll a and b

Section B

6. The slide is mounted with dinoflagellates, c.g. Ceratium, Gonyaulax. These are unicellular eukaryotes, they possess a well-defined nucleus. Dinoflagellates are biflagellates, have two different flagella; one longitudinal, and other transverse. Dinoflagellates belong to Kingdom Protista.

7.

Phycomycetes	Ascomycetes
Hyphae are aseptate and coenocytic.	Hyphae or septate and branched.
Asexual spores are zoospores.	Asexual spores are conidia.

8. (a) Ringworm
   (b) Candidiasis
   (c) Dandruff

9. The main plant body is a sporophyte which is differentiated into true root, stem and leaves. These organs possess well differentiated vascular tissues.
   The leaves in pteridophyta are small (microphylls) as in Selaginella or large (macrophylls) as in ferns.
   The sporophytes bear sporangia that are subtended by leaf like appendages called sporophylls. In some cases sporophylls may form distinct compact structures called strobili or cones.

10. **Importance of gymnosperms**
    (a) Construction purposes: Many conifers such as pine, cedar, etc., are sources of the soft wood used in construction and packing.
    (b) Medicinal uses: An anticancer drug Taxol is obtained from Taxus. Many species of Ephedra produce ephedrine, which can be used in the treatment of asthma and bronchitis.
    (c) Food source: The seeds of Pinus gerardiana (known as chilgoza) are edible. (d) Source of resins: Resins are used commercially for manufacturing sealing waxes and water-proof paints. A type of resin known as turpentine is obtained from various species of Pinus.

Section C

11.

Monera	Protista
The cell wall is made up of peptidoglycan.	The cell wall is made up of peptidoglycan.
Respiratory apparatus is present in the respiratory membrane.	It is present in mitochondria.
Ribosomes are 70S type.	Ribosomes are 80S type.
These are prokaryotic and have naked circular DNA.	Eukaryotic, linear DNA is present in the nucleus.
Extrachromosomal DNA is present in the form of plasmids.	Extrachromosomal DNA is present in organelles like mitochondria and chloroplast.

12. Four major groups of Protozoa are as given below:
    (a) **Amoeboid protozoa:** They are found in fresh water, sea water or moist soil. They have pseudopodia, like amoeba, hence the name amoeboid protozoa.
    (b) **Flagellated Protozoans:** They have flagella for movement. They are either free living or parasitic.

(c) **Ciliated protozoans:** They have thousands of cilia present all over the body. The cilia helps in locomotion and steering of food into the gullet.

(d) **Sporozoans:** Many protozoans have an infectious spore like stage in the life cycle. The spore like stage helps them get transferred from one host to another host.

13. **Virus Structure:** Outside a host cell, virus is a crystalline structure, composed of protein. Inside the crystal, there is genetic material, which can be either RNA or DNA. No virus has both RNA and DNA. Viruses, infecting plants, have single stranded RNA. Viruses, infecting animals, have either single or double stranded RNA or double stranded DNA. The protein coat is called capsid. Capsid is made of smaller subunits, called capsomeres, it protects nucleic acid.

14. Three important features have led to the dominance of Angiosperms. They are as follows:
    i. Development of **deep roots** capable of penetrating the soil.
    ii. Development of **waterproofing material** such as cutin on the aerial surfaces, to reduce water loss through evaporation.
    iii. Development of **strong woody material** to anchor and support above-ground structures.

15.

Red Algae	Brown Algae	Green Algae
Mainly marine.	Marine forms.	Chiefly freshwater.
Only a few are unicellular.	Unicellular forms do not exist.	Unicellular species are more.
Thylakoids unstacked.	Occur in groups of three.	Stacked in groups of 2-20.
Only chlorophyll-a present.	Chlorophyll 'a' and 'c' present.	Chlorophyll 'a' and 'b' is present
Fucoxanthin present	Fucoxanthin is present.	Fucoxanthin is absent.
Phycobilins present	Absent	Phycobilins absent.
Reserve food is Floridean starch.	Reserve food is Laminarin.	Reserve food is starch.
Motile stages are not observed.	Present.	The motile stage is present.

Section D

16. The male and female gametophytes of pteridophytes and gymnosperms different from each other in the following ways:

Male gametophyte of pteridophyte	Male gametophyte of gymnosperm
(i) Distinct male gametophyte may not be present.	(i) Distinct male gametophyte is always present.
(ii) Antheridium is present.	(ii) Antheridium is absent.
(iii) Male gametes are flagellated.	(iii) Male gametes may or may not be flagellated
(iv) Male gametes need water as a medium to swim up to the female gamete.	(iv) Male gametes reach the female gamete through a pollen tube. Water is not required for this purpose.

Female gametophyte of pteridophyte	Female gametophyte of gymnosperm
(i) Distinct female gamete may not be present.	(i) The distinct female gamete is always present.
(ii) It is largely independent.	(ii) The female gamete is not independent of the parent plant.
(iii) It is not enclosed in an ovule.	(iii) It is enclosed in an ovule.