ATOMIC ENERGY CENTRAL SCHOOL NO.4 Rawatbhata

MCQ Examination September (2020-2021)

CLASS 11 - PHYSICS

MCQ TEST- PHYSICS

Time Allowed: 15 minutes **Maximum Marks: 14**

1. Dimensional analysis can be used to **[1]**

   a) check the validity of an equation.
   b) deducing relations among the physical quantities.
   c) to check integration of the equation.
   d) check the order of an equation.

2. Measurement of a physical quantity is essentially the **[1]**

   a) process of comparing with a standard using an instrument
   b) process of observing the physical quantity
   c) process of taking readings on an instrument
   d) process of subdividing the physical quantity

3. A book with many printing errors contains four different formulas for the displacement y of a particle undergoing a certain periodic motion. Choose the correct formula **[1]**

   a) y = a sin $\frac{2\pi t}{T}$
   b) y = a sin vt
   c) y = (a/T) sin t/a
   d) y = a sin 2 π t

4. The relative error is given by **[1]**

   a) $Relative\ error = \frac{\Delta a_{mean}}{1.2a_{mean}}$
   b) $Relative\ error = \frac{\Delta a_{mean}}{2a_{mean}}$
   c) $Relative\ error = \frac{2\Delta a_{mean}}{a_{mean}}$
   d) $Relative\ error = \frac{\Delta a_{mean}}{a_{mean}}$

5. Absolute error of the measurement is **[1]**

   a) the difference between two individual measurements and their mean.
   b) the difference between the individual measurement and the true value of the quantity cubed.
   c) the difference between the individual measurement and the true value of the quantity.
   d) the difference between the individual measurement and the true value of the quantity squared.

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

   a) 4
   b) 1
   c) 3
   d) 5

7. The number of significant digits in 501.040 is **[1]**

   a) 3
   b) 4
   c) 6
   d) 5

8. The number of significant digits in 3.967 is **[1]**

a) 3
b) 5
c) 1
d) 4

9. Unit for a fundamental physical quantity is **[1]**

a) reference standard for the given physical quantity
b) defined as average various reference standards
c) the smallest measurable value of the physical quantity
d) defined as best of various reference standards

10. The surface tension of a liquid is 70 dyne/cm. In MKS system its value is? **[1]**

a) 7×10^2 N/m
b) 7×10^3 N/m
c) 70 N/m
d) 7×10^{-2} N/m

11. A physical quantity P is related to four observables a, b, c and d as follows: $P = \frac{a^3b^2}{\sqrt{cd}}$ The percentage errors of measurement in a, b, c and d are 1%, 3%, 4% and 2%, respectively. If the value of P calculated using the above relation turns out to be 3.763, to what value should you round off the result? **[1]**

a) 3.71
b) 4.0
c) 3.8
d) 3.76

12. In SI system the fundamental units are **[1]**

a) meter, kilogram, second, ampere, Kelvin, mole and watt
b) meter, Newton, second, ampere, Kelvin, mole and candela
c) meter, kilogram, second, coulomb, Kelvin, mole, candela and horse power
d) meter, kilogram, second, ampere, Kelvin, mole and candela

13. The number of significant digits in 8.1000 is **[1]**

a) 3
b) 5
c) 4
d) 1

14. _____ are units of physical quantity that can be expressed as a combination of fundamental physical quantities. **[1]**

a) Complex units
b) Basic units
c) Derived units
d) None of these

ATOMIC ENERGY CENTRAL SCHOOL NO.4 RAWATBHATA

MCQ Examination September (2020-2021)

CLASS 11 - CHEMISTRY

Chemistry

Time Allowed: 15 minutes **Maximum Marks: 13**

1. The number of atoms present in one mole of an element is equal to Avogadro number. Which of the following element contains the greatest number of atoms? **[1]**

   a) 12g He
   b) 0.40g Ca
   c) 46g Na
   d) 4g He

2. The gram molar mass of $CaCO_3$ is **[1]**

   a) 50 g
   b) 100
   c) 150 u
   d) 100 g

3. The calculation of masses or, (sometimes volumes also) of the reactants and the products involved in a chemical reaction is called: **[1]**

   a) molarity
   b) stoichiometry
   c) normality
   d) molality

4. 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

5. One mole of any substance contains 6.022×10^{23} atoms/molecules. Number of molecules of H_2SO_4 present in the 100 mL of 0.02M H_2SO_4 solution is _____. **[1]**

   a) 6.022×10^{23} molecules
   b) 12.044×10^{20} molecules
   c) 12.044×10^{23} molecules
   d) 1×10^{23} molecules

6. What will be the molality of the solution containing 18.25 g of HCl gas in 500 g of water? **[1]**

   a) 1 M
   b) 0.1 m
   c) 1 m
   d) 0.5 m

7. 0.2M NaOH means: **[1]**

   a) 0.2 moles of NaOH per lire of solution
   b) 0.2 moles of NaOH in 100 mL of solution
   c) 0.2 moles of NaOH in 0.50 lires of solution
   d) 0.2 moles of NaOH in 10 mL of solution

8. For the reaction **[1]**
   Fe_2O_3 (s) + 3 CO (g) $\rightarrow$ 2 Fe (g) + 3 CO_2,

224 g of CO is available to react with 400 g Fe_2O_3, the yield of iron and CO_2, are ---------- and ----------respectively:

a) 210 g , 279 g
b) 279 g , 330 g
c) 225 g , 279 g
d) 210 g ,290 g

9. Choose the most appropriate answer amongst the options given below for the statement - A solution of the desired concentration is prepared by diluting _____. **[1]**

a) stock solution
b) solution of known lower concentration.
c) solution of known higher concentration.
d) from a serially diluted solution.

10. How many atoms of hydrogen are in 67.2 L of H_2 at STP? **[1]**

a) 5.612×10^{24}
b) 2.612×10^{24}
c) 3.612×10^{24}
d) 4.612×10^{24}

11. **Assertion:** Empirical formula of glucose is HCHO. **[1]**
Reason: Molecular formula of glucose will also be equal to HCHO.

a) Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
b) Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.
c) Assertion is CORRECT but, reason is INCORRECT.
d) Assertion is INCORRECT but, reason is CORRECT.

12. **Assertion:** The standard unit for expressing the mass of atoms is a.m.u. **[1]**
Reason: a.m.u. stands for mass of 1 atom of carbon.

a) Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
b) Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.
c) Assertion is CORRECT but, reason is INCORRECT.
d) Assertion is INCORRECT but, reason is CORRECT.

13. **Assertion:** 1 mol of O and 1 mol of O_2 contain equal number of particles. **[1]**
Reason: 1 mol of molecules is always double than 1 mol of atoms in all diatomic molecules.

a) Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
b) Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.
c) Assertion is CORRECT but, reason is INCORRECT.
d) Assertion is INCORRECT but, reason is CORRECT.

ATOMIC ENERGY CENTRAL SCHOOL NO.4 RAWATBHATA

MCQ Examination August (2020-2021)

CLASS 11 - MATHEMATICS

Mathematics

Time Allowed: 15 minutes **Maximum Marks: 13**

1. In a town of 10.000 families it was found that 40 %families buy news paper A ,20% families buy news paper B and 10% families buy news paper C ,5% families buy A and B ,3% buy B and C and 4% buy A and C.If 2% buy all the three news papers , then the number of families which buy none of A , B , C is **[1]**

   a) 4000 b) 3300

   c) 5000 d) 4200

2. Which of the following statement is false : **[1]**

   a) A - B = (A $\cup$ B) - B b) A - B = A - (A $\cap$ B)

   c) A - B = A - B' d) A - B = A $\cap$ B'

3. A survey shows that 63% of the people watch a News Channel whereas 76% watch another channel. If x% of the people watch both channel, then **[1]**

   a) x = 39 b) x = 63

   c) $39 \leq x \leq 63$ d) x = 35

4. The number of proper subsets of the set {1, 2, 3} is : **[1]**

   a) 6 b) 7

   c) 8 d) 5

5. The number of non-empty subsets of the set {1, 2, 3, 4} is: **[1]**

   a) 14 b) 16

   c) 17 d) 15

6. Sets A and B have 3 and 6 elements respectively. What can be the maximum number of elements in A $\cup$ B. **[1]**

   a) 3 b) 9

   c) 18 d) 6

7. Let A and B be two sets such that n(A) = 0.16, n(B) = 0.14, n(A $\cup$ B) = 0.25, then n(A $\cap$ B) is equal to **[1]**

   a) 0.5 b) 0.05

   c) 0.3 d) none of these

8. A survey shows that 75% of the Indians like apples, whereas 68% like oranges. What percentage of Indians like both apples and oranges. **[1]**

a) 43%

b) 53%

c) 35%

d) 34%

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

a) 120

b) 30

c) 31

d) 32

10. If A, B and C are non – empty sets, then (A - B) $\cup$ (B - A) equals: **[1]**

a) (A $\cap$ B) - B

b) (A $\cap$ B) $\cup$ (A $\cup$ B)

c) (A $\cup$ B) - B

d) (A $\cup$ B) – (A $\cap$ B)

11. The set of intelligent students in a class is **[1]**

a) a null set

b) a finite set

c) not a well defined collection

d) a singleton set

12. Let A = {a, b, c}, B = {a, b}, C = {a, b, d}, D = {c, d} and E = {d}. Then which of the following statement is not correct? **[1]**

a) D $\supseteq$ E

b) C - B = E

c) B $\cup$ E = C

d) C - D = E

13. State true or false: **[1]**

If A = {3, {4, 5}, 6}. Is statement {{4, 5}} $\subseteq$ A true or not?

Solution

Class 11 - Physics

MCQ TEST- PHYSICS

1. **(b)** deducing relations among the physical quantities.
   Explanation: Dimensional analysis is also used to deduce the relation between two or more physical quantities. If we know the degree of dependence of a physical quantity on another, that is the degree to which one quantity changes with the change in another, we can use the principle of consistency of two expressions to find the equation relating these two quantities.
2. **(a)** process of comparing with a standard using an instrument
   Explanation: The Measurement of a given quantity is essentially an act or result of comparison between a quantity whose magnitude (amount) is unknown, with a similar quantity whose magnitude (amount) is known, the latter quantity being called a Standard.
3. **(a)** y = a sin $\frac{2\pi t}{T}$
   Explanation: Dimension of y = $M^0 L^1 T^0$
   Dimension of a = $M^0L^1T^0$
   Dimension of $sin\frac{2\pi t}{T}$ = $M^0L^0T^0$
   Dimension of L.H.S = Dimension of R.H.S. Hence, the given formula is dimensionally correct.
4. **(d)** $Relative\ error = \frac{\Delta a_{mean}}{a_{mean}}$
   Explanation: Relative Error or fractional error : It is defined as the ration of mean absolute error to the mean value of the measured quantity.
   $\delta a = \frac{mean\ absolute\ value}{mean\ value}$
   $Relative\ error(\delta a) = \frac{\Delta a_{mean}}{a_{mean}}$
5. **(c)** the difference between the individual measurement and the true value of the quantity.
   Explanation: Absolute error is defined as the magnitude of difference between the actual and the individual values of any quantity in question.
   Say we measure any given quantity for n number of times and a_1, a_2, a_3 ..... a_n are the individual values, then arithmetic mean is given by:
   a_m =([a_1+a_2+a_3+ ..... + a_n]/n)
   Now absolute error formula as per definition will be:
   $\Delta a_1 = a_m - a_1$
   $\Delta a_2 = a_m - a_2$
   .....
   $\Delta a_n = a_m - a_n$
6. **(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.
7. **(c)** 6
   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 6 significant digits.
8. **(d)** 4
   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 4 significant digits.

9. **(a)** reference standard for the given physical quantity
   Explanation: Unit is the reference used as the standard measurement of a physical quantity. The unit in which the fundamental quantities are measured are called fundamental unit and the units used to measure derived quantities are called derived units.

10. **(d)** 7 × 10^{-2} N/m
    Explanation: $1dyne = 10^{-5}\ N$
    $1cm = 10^{-2}\ m$
    $70dyne/m = 70 \times \frac{10^{-5}}{10^{-2}}$ = 7 × 10^{-2} N/m

11. **(c)** 3.8
    Explanation: Value of P is given as 3.763.
    By rounding off the given value to the first decimal place,we get
    P = 3.8

12. **(d)** meter, kilogram, second, ampere, Kelvin, mole and candela
    Explanation: The SI base units and their physical quantities are the metre for measurement of length, the kilogram for mass, the second for time, the ampere for electric current, the kelvin for temperature, the candela for luminous intensity, and the mole for amount of substance.

13. **(b)** 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.

14. **(c)** Derived units
    Explanation: Derived units are units which may be expressed in terms of base units by means of mathematical symbols of multiplication and division.

Solution

Class 11 - Chemistry

Chemistry

1. **(a)** 12g He
   Explanation: (i) 12 g He = 3 moles of He
   No. of atoms of He = $3 \times N_A = 3 \times 6.022 \times 10^{23}$
   (ii) 4 g He = 1 mole of He
   No. of atoms Of He = $1 \times N_A = 1 \times 6.022 \times 10^{23}$
   (iii) 46 g of Na = 2 moles of Na
   No. of atoms of Na = $2 \times N_A = 2 \times 6.022 \times 10^{23}$
   (iv) 0.40 g Ca = 0.1 mole of Ca
   No. of atoms of Ca = $0.1 \times N_A = 0.1 \times 6.022 \times 10^{23}$
   Hence, 12 g of He contains maximum number of atoms.

2. **(d)** 100 g
   Explanation: The gram molar mass of $CaCO_3$ is calculated by,

   i. adding up the atomic masses of Ca, C & 3 O atoms &,
   ii. representing the molar mass in grams.

   Thus, the gram molar mass of $CaCO_3$
   = Σ [atomic mass of Ca, atomic mass of C, 3 $\times$ atomic mass of O]
   = [40 + 12 + (3 $\times$ 16)] g
   = (40 + 12 + 48) g
   = **100g**
   It should be noted that, atomic mass of Ca = 12
   atomic mass of C = 12
   atomic mass of O = 16

3. **(b)** stoichiometry
   Explanation: Stoichiometry is a method to express quantitative aspects of a chemical reaction.
   Usually, the masses of reactants as well as those of products in a chemical reaction are calculated using a corresponding balanced chemical equation.
   It is convenient and hence desirable to calculate volumes of gaseous reactants and products.

4. **(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

5. **(b)** 12.044×10^{20} molecules
   Explanation: No. of moles of H_2SO_4 = molarity $\times$ Volume in litres
   $= 0.02 \times 0.1 = 2 \times 10^{-3}$
   Molarity = 0.02 M, Volume of sol.= 100 mL= 0.1 L
   No. of molecules of H_2SO_4 = $2 \times 10^{-3} \times 6.022 \times 10^{23}$
   =12.044×10^{20}molecules

6. **(c)** 1 m
   Explanation: $Molality = \frac{W_B \times 1000}{M_B \ W_A}$
   W_B = 18.25
   M_B = 36.5

M_A = 18

$Molality = \frac{18.25 \times 1000}{36.5 \times 500} = 1m$

7. **(a)** 0.2 moles of NaOH per lire of solution
Explanation: Since M denotes molarity of a solution & Molarity
= number of moles of a solute (ie given as NaOH) / Volume of the solution in Litres
∴ 0.2M solution means 0.2moles of solute(NaOH) present in 1L of solution.

8. **(b)** 279 g , 330 g
Explanation: Calculations :

i. Convert the amounts given into number of moles ,
Moles of CO
= $(\frac{224}{28})$
=8 moles
Moles of Fe_2O_3
= $(\frac{400}{159.69})$
= 2.50 moles.

ii. Stoichiometric calculations ,
3 moles of CO is needed for 1 mole of Fe_2O_3
∴ 8 moles of CO will require
= $\frac{8X1}{3}$ = $\frac{8\times1}{3}$ mole
= 2.66 mole of Fe_2O_3,
Thus it is inferred that a lesser number of moles of Fe_2O_3 has been taken to react & hence Fe_2O_3 is limiting reagent.
Again , 1 mole of Fe_2O_3 produces 2 mole of Fe
∴ 2.5 mole of Fe_2O_3 will produce
= (2.5×2) moles of Fe
= 5 moles of Fe
= (molar mass of Fe $\times$ 5) g
= $(55.845 \times 5)g$
= 279.23 g of Fe
or $\approx$ **279 g of Fe.**
Further , 1 mole of Fe_2O_3 produces 3 mole of CO_2
∴ 2.5 mole of Fe_2O_3 will produce
= (3×2.5) moles of CO_2]
7.5 mole of CO_2
∴ mass of CO_2
= (7.5 $\times$ molar mass of CO_2) g
= $(7.5 \times 44)g$
=**330g.of CO_2**

9. **(a)** stock solution
Explanation: Stock solution can best be described as a concentrated solution of known accurate concentration that will be used for future laboratory use.
Since large amounts of solutes are used for preparing stock solution a more accurate concentration of it can be achieved quite easily, and as such the chances are slim to get erroneous results of the related experiments.
In addition, stock solutions are generally more stable as compared to a working solution since they usually do not support bacterial growth.
Multiple working solutions can be prepared by dilution of stock solution using easy calculation and process.

10. **(c)** 3.612×10^{24}
Explanation: Step 1:
Number of moles of H_2 in 67.2 L of H_2
$= \frac{67.2}{22.4}$
= 3 moles
Step 2:
Number of molecules in 1 moles of H_2
$= 6.02 \times 10^{23}$ molecules of H_2
Since H_2 is a diatomic gas the number of atoms in 1 mole of H_2
$= (2 \times 6.02 \times 10^{23})$
$= 12.04 \times 10^{23}$ atoms of H atoms
(since, one molecule of H_2 contains 2 atoms).
∴ Number of atoms in 3 moles of H_2
$= (3 \times 12.04 \times 10^{23})$
$= 3.612 \times 10^{24}$ atoms of H

11. **(c)** Assertion is CORRECT but, reason is INCORRECT.
Explanation: Assertion is CORRECT but, reason is INCORRECT.

12. **(c)** Assertion is CORRECT but, reason is INCORRECT.
Explanation: Assertion is CORRECT but, reason is INCORRECT.

13. **(c)** Assertion is CORRECT but, reason is INCORRECT.
Explanation: Assertion is CORRECT but, reason is INCORRECT.

Solution

Class 11 - Mathematics

Mathematics

1. **(a)** 4000
   Explanation: 4000

2. **(c)** A - B = A - B'
   Explanation: We know that A - B = $A \cap B'$
   Here, we see that A - B = $A \cap B$
   $\therefore$ this option is false.

3. **(c)** $39 \leq x \leq 63$
   Explanation: Suppose p% and q% of people watch a news channel and another channel respectively
   n(p)= 63, n(q) = 76, $n(p \cap q) = x$, $n(p \cup q) \geq 100$
   We know that,
   $n(p \cup q) \geq n(p) + n(q) - n(p \cap q)$
   $\Rightarrow 100 \geq 63 + 76 - x$
   $\Rightarrow x \geq 139 - 100$
   $\Rightarrow x \geq 39$
   Now, $n(p \cup q) \leq n(p)$ and $n(p \cup q) \leq n(q)$
   $\Rightarrow x \leq 63$ and $x \leq 76$
   Therefore, $39 \leq x \leq 63$

4. **(b)** 7

   Explanation: The no. of proper subsets = $2^n - 1 = 2^3 - 1 = 7$
   Here n = no of elements of given set = 3.

5. **(d)** 15

   Explanation: Total no. of subset including empty set = 2^n

   So total subset = $2^4 = 16$
   The no. of non empty set = 16 - 1 = 15

6. **(b)** 9
   Explanation: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
   If $n(A \cap B) = 0$ then $n(A \cup B)$ is max.
   So max number of element in $A \cup B = 9$

7. **(b)** 0.05
   Explanation: Given n(A) = 0.16, n(B) = 0.14, $n(A \cup B) = 0.25$
   $n(A \cap B) = n(A) + n(B) - n(A \cup B) = 0.16 + 0.14 - 0.25 = 0.05$

8. **(a)** 43%
   Explanation: Let U denote the set of Indians and let A and B denote the sets of Indians who like apples and oranges respectively. Then
   n(U) = 100, n(A) = 75 and n(B) = 68
   We have $n(U) = 100 \Rightarrow n(A \cup B) = 100$
   So $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
   $\Rightarrow 100 = 75 + 68 - n(M \cap P)$
   $\Rightarrow n(M \cap P) = 143 - 100 = 43$
   Which means 43 percentage of Indians like apples and oranges.

9. **(c)** 31

   Explanation: The number of proper subsets of any set is given by the formula $2^n - 1$ where n is the number of elements in the set.
   Here, we have n = 5

   $\therefore$ Number of proper subsets of A = $2^5 - 1 = 31$

10. **(d)** $(A \cup B) – (A \cap B)$
Explanation: We have $(A \cup B) = (A - B) \cup (A \cap B)$
Hence $(A \cup B) - (A \cap B) = (A - B) \cup (B - A)$

11. **(c)** not a well defined collection
Explanation: The set of all intelligent students of a class, it is not possible to do so. No two persons will have the common list. Thus the collection of intelligent students in the class is not a set.

12. **(d)** C - D = E
Explanation: C - D = {a, b, c} - {c, d} = {a, b}
But E = {d}
Hence C - D $\neq$ E

13. **(a)** True
Explanation: True
Explanation: {4, 5} is an element of set {{4, 5}}
Let {4, 5} = x
{{4, 5}} = {x}
we have, A = {3, {4, 5}, 6}
Now, A = {3, x, 6}
So, x is in {x} and x is also in A
So , {x} is a subset of A
Hence, {{4, 5}} $\subseteq$ A