PRACTICE PAPER

CHEMISTRY

Q1.

Hydrolysis of one mole of peroxodisulphuric acid produces

(a) Two moles of sulphuric acid
(b) Two moles of peroxomonosulphuric acid
(c) One mole of sulphuric acid and one mole of peroxomonosulphuric acid
(d) One mole for sulphuric acid, one mole of peroxomonosulphuric acid and one mole of hydrogen peroxide

Q2.

Which of the following statements about electronegativity is the correct one?

(a) Electronegativity is the energy released when an electron is added to an atom of the element.
(b) Electronegativity is the reciprocal of ionization energy.
(c) Electronegativity is the reciprocal of ionisation energy
(d) Electronegativity is the difference between ionisation energy and electron affinity of an element.
(e) Electronegativity of an element is its tendency to acquire electron(s).

Q3.

The dissociation constant of a monobasic acid is Errot! Bookmark not defined. 1.0×10^{-9}. The pH of its 0.1 M aqueus solution is:

(a) 1
(b) 5
(c) 7
(d) 9

Q4.

Mixing 0.10 mole of NaOH, 0.10 mole of $HC_2H_3O_2$ (acetic acid) and 1 litre of water yields the product formed is

(a) acidic
(b) neutral
(c) basic
(d) red

Q5.

When phenol is heated strongly with zinc dust the product formed is

(a) diphenyl ether
(b) benzene
(c) dibenzyl
(d) o-ohydroxybenxoic acid

Q6.

Chlorobenzene can be prepared by treating aniline with

(a) HCI
(b) Cuprous chloride
(c) CI_2 in the of anhydrous
(d) HNO_2 followed by heating with curpours chloride

Q7.

Which of the following reactions cannot be used for the reduction of $>C = 0$ to $> CH_2$

(a) Clemmensen reaction
(b) Wolff-Kishner reaction
(c) Wurtz reaction
(d) HI and red P

Q8.

The standard E.M.F. for the cell reaction:

$Zn(s) + Cu^{2+}$ (aq) $\rightarrow Zn^{2+}$ (aq) $+$ (Cu) is 1.10 volts at 25°C. The EMF. For the cell reaction when 0.01 M Cu^{2+} and 0.1 M Zn^{2+} solutions are used at 25° C is:
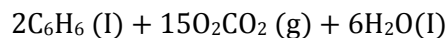
(a) 1.07 V
(b) 0.110 V
(c) – 1.10 V
(d) – 0.110 V

Q9.

The solutions A and B are 0.1 and 0.2 molar in a substance. If 100 ml of A is mixed with 25 ml of B, and there is no change in volume, then the final molarity is

(a) 0.15
(b) 0.18
(c) 0.20
(d) 0.12

Q10.

How much will be the difference between heat of reaction at constant pressure and that at constant volume for the reaction at 25°C?

$2C_6H_6$ (I) + $15O_2CO_2$ (g) + $6H_2O$(I)

   (a) + 7.4 kJ
   (b) – 7.4 kJ
   (c) + 14.8 kJ
   (d) None of these

Q11.

The pH of $H_2 CO_3$. When it is only 10% dissociated is

   (a) 2.699
   (b) 3.699
   (c) 3.00
   (d) 0.2699

Q12.

Which one of the following series in the case of hydrogen spectrum is not of infrared region

   (a) Pashchen series
   (b) Brackett series
   (c) Balmer series
   (d) Pfund series

Q13.

Chlorine cannot be dried by passing it over

   (a) Conc. H_2SO_4
   (b) Lime
   (c) Anhyd.$CaCI_2$
   (d) P_4O_{10}

Q14.

Bromine reacts with hot aqueous alkali to give bromide and bromate. What is the change that is brought about in the oxidation state of bromine to bromated $(BrO_3)^-$?

   (a) – 7 to +5
   (b) 0 to +5
   (c) – 1 to +7
   (d) 0 to +7

Q15.

Oxidation of anline with $K_2Cr_2O_7 / H_2SO_4$ gives

(a) Phenylhydroxylamine
(b) P-benzoquinone
(c) Nitrosobenzene
(d) Nitrobenzene

Q16.

Which of the following does not contain a carboxyl group?

(a) Tartaric acid
(b) Carbolic acid
(c) Malonic acid
(d) Lactic acid

Q17.

Which of the following is the strongest acid?

(a) Methanoic acid
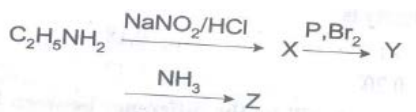(b) Trichloroacetic acid
(c) Cloroactic acid
(d) Propanoic acid

Q18.

What kind of symmetry is exhibited by match box.

(a) Cubic
(b) Tetragonal
(c) Orthohombic
(d) Monoclinic

Q19.

Identify Z In the following sequence of reaction.

$$C_2H_5NH_2 \xrightarrow{NaNO_2/HCl} X \xrightarrow{P,Br_2} Y$$
$$\xrightarrow{NH_3} Z$$

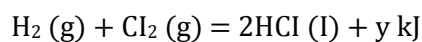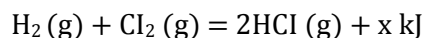(a) Cyanoethane
(b) Ethanamide
(c) Methylamine
(d) ethylamine

Q20.

The order of boiling point is

(a) Alkane > Alkene > Alkene
(b) Alkene > Alkyne > Alkane
(c) Alkane > Alkene > Alkyne
(d) Alkyne > Alkane > Alkene

Q21.

For the question reactions:

H_2 (g) + CI_2 (g) = 2HCI (g) + x kJ

H_2 (g) + CI_2 (g) = 2HCI (I) + y kJ

Which of the following statements is correct?

(a) x > y
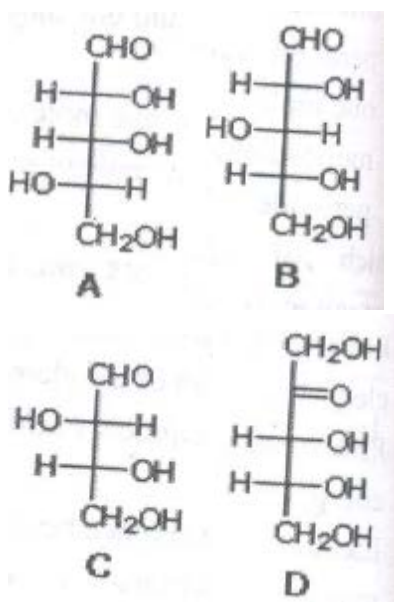(b) x > y
(c) x + y = 0
(d) x = y

Q22.

Incomplete combustion of petrol or diesel oil in automobile engines can be best detected by testing the fuel gases for the presence of

(a) carbon monoxide and water vapour
(b) carbon monoxide
(c) nitrogen dioxide
(d) sulphur dioxide

Q23.

Which of the following is a D-aldopentose?

(a) A
(b) B
(c) B and D
(d) None of these

Q24.

The oxidation sate of molybdenum in its oxo complex species $[Mo_2 O_4 (C_2 H_4)_2 (H_2 O_2)]^{2-}$ is

(a) 2
(b) 3
(c) 4
(d) 5

Q25.

According to Freundlich's adsorption isotherm (where n > 1)

(a) $\frac{x}{m} = kp^{1/n}$
(b) $\frac{m}{x} = kP^{1/n}$
(c) $xm = kP^{1/n}$
(d) $\frac{x}{m} = k/P^{1/n}$

Q26.

$TiH_{1.73}$ is an example of which type of the hybride?

    (a) Metallic
    (b) Ionic
    (c) Covalent
    (d) Polymeric

Q27.

Which of the following is an optically active compound?

    (a) 1 – chloropropane
    (b) Isobutyl alcohol
    (c) Butanol - 2
    (d) Pentanol – 3

Q28.

The large increase in rate of a reaction on rise temperature is due to

    (a) The increase in activation energy barrier
    (b) The increase in collision frequency
    (c) The increase in the fraction of molecules having energy > the threshold energy
    (d) The increase in kinetic energy of molecules

Q29.

Which of the following alkaline earth metals has highest ionic mobility in aqueous solution?

    (a) Be^{2+}
    (b) Mg^{2+}
    (c) Ba^{2+}
    (d) Ca^{2+}

Q30.

The dihedral angle in a staggered conformation of C_2H_6 is

    (a) 120°
    (b) 60°
    (c) 0°
    (d) 90°

PHYSICS

Q1.

Capacity of a capacitor is 2 ± 0.1 farad and applied voltage is 25 ± 0.5 V. The error in charge Q is

(a) 3.5 C
(b) 5.3 C
(c) 0C
(d) 2.5 C

Q2.

A ball is dropped from a height of 5 m on a planet where the acceleration due to gravity is not known. On bouncing it rises to 1.8 m. The ball loses its velocity on bouncing by a factor of

(a) 16/25
(b) 2/5
(c) 3/5
(d) 9/2

Q3.

A spring of force constant K is cut into two pieces such that one piece is double the length of the other. Then the long piece will have a force constant of

(a) 2/3 K
(b) 3/2 K
(c) 3 K
(d) 6 K

Q4.

A body is moved along a straight line bey a machine delivering constant power. The distance moved by the body in time t is proportional to

(a) $t^{1/2}$
(b) $t^{3/4}$
(c) $t^{3/2}$
(d) t^3

Q5.

A 30 kg boy and a 40 kg girl start from same staring line and run in opposite direction with speed of 3 m/s and 2 m/s repectively. The kinetic energy of centre of mass is

(a) 0.5 J
(b) 0.6 J
(c) 0.7 J
(d) 0.8 J

Q6.

Weight of a body at earth's surface is W. at a depth halfway to the centre of the earth it will be

(a) W / 8
(b) W / 4
(c) W / 2
(d) W

Q7.

In the absence of gravity, which of the following will be meaningless for a fluid?

(a) Viscosity
(b) Surface tension
(c) Pressure
(d) Upthrust

Read the Statement 1 and Statement 2 carefully to mark the correct option out of the options given below

1. If both Statement 1 and Statement 2 are true and Statement 2 is the correct explanation of the Statement 1

2. If both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of Statement 1

3. If Statement 1 is true but Statement 2 is false

4. If statement 1 is Statement 1 is false but Statement 2 is true

Q8.

Statement 1: Infrared radiation are responsible for heating the body

Statement 2: Radiation is the fastest mode of heat transfer

   (a) 1
   (b) 2
   (c) 3
   (d) 4

Read the following paragraph

An ideal gas having initial pressure P, volume V and temperature T is allowed to expand adiabatically until its volume becomes 5.66 V while its temperature falls to T/2.

Now answer the following questions

Q9.

Coefficient of volume expansion of the gas is

   (a) 1.1
   (b) 1.2
   (c) 1.3
   (d) 1.4

Q10.

The degrees of freedom gas molecules posses

   (a) 3
   (b) 5
   (c) 6
   (d) 7

Q11.

A person standing between the two hills, 510m apart, claps his hands and hears two echoes at the end of one second and two second. The velocity of sound in air is

   (a) 120 m/s
   (b) 340 m/s
   (c) 510 m/s
   (d) 255 m/s

Q12.

Two capacitors of capacitance 3μF and 6μF are charged to a potential of 12V each. They are now connected to each other with the positive. Plate of each joined to the negative plate of other. The potential difference across each will be

   (a) 6 V
   (b) 4 V
   (c) 3 V
   (d) Zero

Q13.

An electric current is passed through a circuit containing two wires of same material connected in parallel. If the lengths and radii of wires are in the ratio of 4/3 and 2/3, the ratios of the currents passing through the wire will be

   (a) 3
   (b) 1/3
   (c) 8 /9
   (d) ½

Q14.

Two resistors are placed in gaps of a metre bridge. The balance point is obtained from zero end at 20 cm. A resistor of 15Ω is in series with smaller of two, the null point shifts to 40 cm. the value of smaller restor in Ohms is

   (a) 3
   (b) 6
   (c) 9
   (d) 12

Q15.

The work done in turning a magnet of magnetic moment M by an angle of 90° from the magnetic meridian is n times the corresponding work done to turn through an angle of 60°. The value of n is

   (a) ½
   (b) 2
   (c) ¼
   (d) 1

Q16.

A capacitor of capacity 2μF is charged to a potential difference of 12 V. it is then connected across an inductor of 0.6 mH. Current in the circuit at a time when potential difference across the capacitor is 6V is

(a) 0.6 A
(b) 1.2 A
(c) 2.4 A
(d) 3.6 A

Q17.

A wire loop of dimensions 0.25 m x 2m and mass 0.5 kg falls from height of 5 m above apace of 15 m occupied by uniform field of IT. Resistance of loop is 0.25Ω. the time taken by loop when it just starts coming out of field is

(a) 1s
(b) 0.2 s
(c) 3.2 s
(d) 2.2 s

Q18.

Average energy density of electromagnetic wave in a medium of dielectric constant 2.25 and relative permeability 4 is

(a) 2×10^{-8} J m^{-3}
(b) 3×10^{-9} J m^{-3}
(c) 1×10^{-8} J m^{-3}
(d) 4×10^{-4} J m^{-3}

Q19.

An object of height 5 cm is placed 2 m in front of a concave mirror of radius of curvature 40 cm. The size of image is

(a) 0.25 cm
(b) 0.55 cm
(c) 1. 10 cm
(d) 2.8 cm

Q20.

In a Young's double slit experiment, 12 fringes are observed to be formed in a certain segment of the screen when light of wavelength 600 nm is used. If the wavelength of light of light is changed to 400 nm, number of fringes observed in the same segment of the screen is

    (a) 12
    (b) 18
    (c) 24
    (d) 30

Q21.

Ordinary light incident on a glass slab at the polarizing angle θ, suffers a deviation of 22° .The Value of angle of refraction in glass is

    (a) 34°
    (b) 22°
    (c) 56°
    (d) 68°

Q22.

The wavelength of k_α line produced by an X ray tube is 0.76 A°. The atomic number of material of anode of tube is

    (a) 41
    (b) 14
    (c) 51
    (d) 15

Q23.

The electron in a hydrogen atom makes a transition from $n = n_1$ to $n = n_2$ state. The time period of the electron in the initial state is eight times in the final state. The possible values of n_1 and n_2 are

    (a) $n_1 = 8$, $n_2 = 1$
    (b) $n_1 = 6$, $n_2 = 2$
    (c) $n_1 = 4$, $n_2 = 2$
    (d) $n_1 = 8$, $n_2 = 2$

Q24.

Speed of an electron in the first orbit of hydrogen atom is 2.2 x 10⁶ m/s and radius of orbit is 0.5 A°. The value of strength of magnetic field due to motion of electron is

(a) 12 T
(b) 14 T
(c) 16 T
(d) 10 T

Q25.

The following truth table belongs to which of the gates?

A	B	C
1	1	0
1	0	0
1	0	1
1	1	1

(a) NAND
(b) AND
(c) XOR
(d) NOR

Q26.

At which of the following frequency the communication will not be reliable for a receiver situated beyond horizon

(a) 1 kHz
(b) 10 MHz
(c) 1 GHz
(d) 1000 GHz

Q27.

A solid sphere having a charge Q is surrounded by an uncharged concentric conducting hollow spherical shell. Let the potential difference between the surface of the solid sphere and that of outer surface of the hollow shell be V. If the shell is now given a charge of -3Q, the new potential difference between the same two will be

(a) V
(b) 2 V
(c) 4 V
(d) – 2 V

Q28.

A charged particle is released from rest in a region of steady and uniform electric and magnetic fields which are parallel to each other. The particle will move in a

(a) Straight line
(b) Circle
(c) Helix
(d) Cycloid

Q29.

A car with a siren of frequency of 8kHz is moving with uniform velocity 36km /h towards a tall building which reflects the sound waves. The speed of sound in air is 320 m/s. The frequency of the siren heard by car driver is

(a) 8. 50 kHz
(b) 8.25 kHz
(c) 7. 75 kHz
(d) 7.50 kHz

Q30.

A particle moves in a circular path with decreasing speed. Choose the correct statement

(a) Angular momentum remains constant
(b) Acceleration is towards the centre
(c) Particle moves in a spiral path with decreasing radius
(d) The direction of angular momentum remains constant

MATHEMATICS

Q1.

Let A and B have 4 and 5 elements respectively. What can be the minimum number of elements in A∪ B?

(a) 3
(b) 9
(c) 6
(d) 5

Q2.

A, B, C be three sets, such that A ∪ B = A ∪ C and A ∩ B = A ∩ C. Which of the following conditions is true according to the given statement?

    (a) B = C
    (b) A = C
    (c) A = B = C
    (d) A = B

Q3.

If $w = \frac{z-1}{z+1}$, then real part of w is equal to

    (a) $\frac{x^2+y^2+1}{(x+1)^2+y^2}$
    (b) $\frac{(x^2+y^2-2x+1)}{x^2+y^2-1}$
    (c) $\frac{x^2-y^2}{(x-1)^2+y^2}$
    (d) $\frac{x^2+y^2}{(x+1)^2+y^2}$

Q4.

If |z – 1| < |z – 3|, then its solution is given by

    (a) Re(z) > 2
    (b) Re (z) > 3
    (c) Im (z) = 1
    (d) None of these

Q5.

For real symmetric matrices A and B, which of the following is true?

    (a) AB is a symmetric matrix b)
    (b) AB = BA
    (c) All eigen values of AB are real, if AB = BA
    (d) AB is invertible, if either A is invertible or B is invertible

Q6.

The value of determinate $\begin{vmatrix} y+z & x & x \\ y & z+x & y \\ z & z & x+y \end{vmatrix}$ is equal to

(a) 6xyz

(b) 4 xyz

(c) xy + yz + zx

(d) xyz

Q7.

The total number of different combinations of names which can be made from the letters of the word ADVANCED. Using all the letters at a time, in which no letter is repeated are

(a) 10080

(b) 10092

(c) 10020

(d) None of these

Q8.

There are m copies each of n different books in a university library. The number of ways in which one or more than one book can be selected is

(a) $(m + 1)^n - 1$
(b) n
(c) m^n
(d) None of these

Q9.

The sum of the series $\frac{1}{1.2} - \frac{1}{2.3} + \frac{1}{3.4} \ldots \ldots \ldots \ldots \ldots$ is equal to

(a) $\log_e 2 - 1$
(b) $\log_e 2$
(c) $\log_e \left(\frac{4}{e}\right)$
(d) None of these

Q10.

If in the expansion of $(1 + x)^n$, a, b and c are three consecutive coefficients, find value of n.

(a) $\frac{ac + ab + be}{b^2 + ac}$
(b) $\frac{2ac + ab + bc}{b^2 - ac}$
(c) $\frac{ab + ac}{b^2 - ac}$
(d) None of these

Q11.

The sum of n terms of the series $1 + (1 + 3) + (1 + 3 + 5) + \ldots$ is

(a) $\left[\frac{n(n+1)}{2}\right]$
(b) $\frac{n(n+1)(2n+1)}{6}$
(c) n^2
(d) *None of these*

Q12.

The sum to n terms of the series $1.3 + 3.5 + 5.7 + \ldots\ldots$ is

(a) $8n^2 + 12n + 2$
(b) $\frac{4n^3 + 6n^2 + n}{3}$
(c) $\frac{4n^3 + 6n^2 - n}{3}$
(d) None of these

Q13.

$Lt_{x \to 0} \frac{5^x - 6^x}{7^x - 8^x}$ is equal to

(a) $\log\left(\frac{5}{6}\right) / \log\left(\frac{7}{8}\right)$
(b) 0
(c) 1
(d) ∞

Q14.

Let $f(x) = |X|^2$, then f' (0) =

(a) 2
(b) – 1
(c) 1
(d) 0

Q15.

If $y = ax^{n+1} + bx^{-n}$, then $x^2\frac{d^2y}{dx^2}$ is equal to

(a) ny
(b) n^2 y
(c) n (n – 1) y
(d) n (n + 1) y

Q16.

$\int \cos^2 x \, dx =$

    (a) $-\cot x - x + c$

    (b) $-\cot x + x + c$

    (c) $\cot x - x + c$

    (d) None of these

Q17.

$\int_0^{\pi/2} \sin^2 x \, dx =$

    (a) π

    (b) $\frac{\pi}{2}$

    (c) $\frac{\pi}{3}$

    (d) $\frac{\pi}{4}$

Q18.

The order and degree of the differential equation $\frac{d^2 y}{dx^2} = \left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/4}$ are respectively

    (a) $(6, 2)$

    (b) $(2, 4)$

    (c) $(3, 4)$

    (d) None of these

Q19.

The lines $px + qy + r = 0$, $qx + ry + p = 0$, $rx + py + q = 0$ are concurrent if

    (a) $p + q + r = 0$

    (b) $p^2 + q^2 + r^2 + pq + qr + rp = 0$

    (c) $p^2 + q^2 + r^2 + 3pqr = 0$

    (d) All are correct

Q20.

The focus of the parabola $x^2 + 4x + 3y + 5 = 0$

    (a) $\left(2, \frac{1}{3}\right)$

    (b) $\left(-2, -\frac{1}{3}\right)$

    (c) $\left(-2, \frac{1}{3}\right)$

    (d) None of these

Q21.

Any three vectors such that $\vec{a}.\vec{b} \neq 0, \vec{b}.\vec{c} \neq 0$.then$\vec{a}$ and $\vec{c}$ are

    (a) Parallel
    (b) Perpendicular
    (c) Inclined at an angle of $\frac{\pi}{4}$ between them
    (d) Inclined at an angle of $\frac{\pi}{6}$ between them

Q22.

Three identical dice are rolled. The probability that the same number will appear on each of them is

    (a) 1 / 36
    (b) 1 / 216
    (c) 1 / 6
    (d) None of these

Q23.

Out of 40 consecutive integers, two are chosen at random, the probability that their sum is odd is

    (a) $\frac{1}{2}$
    (b) $\frac{1}{200}$
    (c) $\frac{20}{39}$
    (d) None of these

Q24.

The equation sinxcosx = 2 has

    (a) One solution
    (b) Two solutions
    (c) Infinite solutions
    (d) No solutions

Q25.

$\sin^{-1}\left(\sin\frac{5\pi}{6}\right)$ is equal to

    (a) $\frac{7\pi}{6}$
    (b) π
    (c) π / 6
    (d) None of these

Q26.

$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots$ .is equal to

    (a) eog2

    (b) e

    (c) e^{-1}

    (d) None of these

Q27.

The sum of the series $\frac{1}{1.2} + \frac{1}{3.4} + \frac{1}{5.6} + \ldots \ldots \ldots \ldots \ldots \ldots$ to ∞ is

    (a) log 2

    (b) e^{-1}

    (c) $\sqrt{e}$

    (d) None of these

Q28.

Let f(x) = [x], then f' (1) =

    (a) 0

    (b) 1

    (c) Does not exit

    (d) None of these

Q29.

Algebraic sum of intercepts made by the plane x + 2y + 3z – 4 = 0 on the axes is

    (a) $\frac{21}{3}$

    (b) $\frac{22}{3}$

    (c) $\frac{23}{3}$

    (d) None of these

Q30.

f (x) = $\big||x| - 1\big|$ is not differentiable at x =

    (a) ± 1

    (b) 0

    (c) 1

    (d) $0, \pm 1$