

**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  $1.0 \times 10^{-9}$ . The pH of its 0.1 M aqueous solution is:

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

**Q4.**

Mixing 0.10 mole of NaOH, 0.10 mole of  $\text{HC}_2\text{H}_3\text{O}_2$  (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-hydroxybenzoic acid

**Q6.**

Chlorobenzene can be prepared by treating aniline with

- (a) HCl
- (b) Cuprous chloride
- (c)  $\text{Cl}_2$  in the of anhydrous
- (d)  $\text{HNO}_2$  followed by heating with cuprous chloride

**Q7.**

Which of the following reactions cannot be used for the reduction of  $>\text{C} = \text{O}$  to  $>\text{CH}_2$

- (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:

$\text{Zn(s)} + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + (\text{Cu})$  is 1.10 volts at  $25^\circ\text{C}$ . The EMF. For the cell reaction when 0.01 M  $\text{Cu}^{2+}$  and 0.1 M  $\text{Zn}^{2+}$  solutions are used at  $25^\circ\text{C}$  is:

- (a) 1.07 V
- (b) 0.110 V
- (c) - 1.10 V
- (d) - 0.110 V

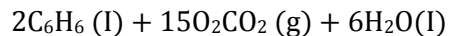
**Q9.**

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?



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

**Q11.**

The pH of  $\text{H}_2\text{CO}_3$ . 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) Paschen series
- (b) Brackett series
- (c) Balmer series
- (d) Pfund series

**Q13.**

Chlorine cannot be dried by passing it over

- (a) Conc.  $\text{H}_2\text{SO}_4$
- (b) Lime
- (c) Anhyd.  $\text{CaCl}_2$
- (d)  $\text{P}_4\text{O}_{10}$

**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 bromate ( $\text{BrO}_3^-$ )?

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



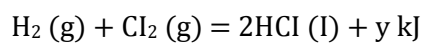
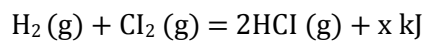
**Q20.**

The order of boiling point is

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

**Q21.**

For the question reactions:



Which of the following statements is correct?

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

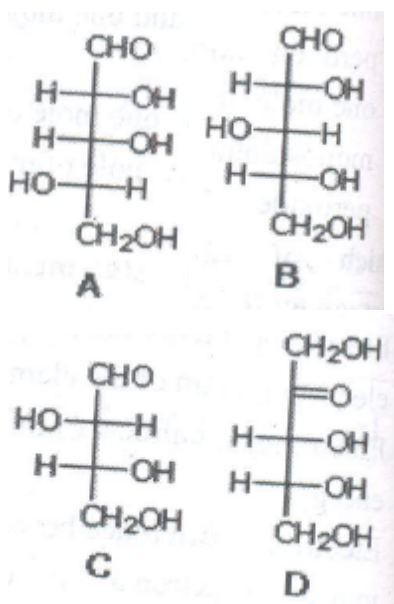
**Q22.**

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 state of molybdenum in its oxo complex species  $[\text{Mo}_2\text{O}_4(\text{C}_2\text{H}_4)_2(\text{H}_2\text{O}_2)]^{2-}$  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<sub>1.73</sub> is an example of which type of the hydride?

- (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<sup>2+</sup>
- (b) Mg<sup>2+</sup>
- (c) Ba<sup>2+</sup>
- (d) Ca<sup>2+</sup>

**Q30.**

The dihedral angle in a staggered conformation of C<sub>2</sub>H<sub>6</sub> is

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

## PHYSICS

**Q1.**

Capacity of a capacitor is  $2 \pm 0.1$  farad and applied voltage is  $25 \pm 0.5$  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)  $\frac{2}{3} K$
- (b)  $\frac{3}{2} K$
- (c) 3 K
- (d) 6 K

**Q4.**

A body is moved along a straight line by 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 starting line and run in opposite direction with speed of 3 m/s and 2 m/s respectively. 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  $3\mu\text{F}$  and  $6\mu\text{F}$  are charged to a potential of  $12\text{V}$  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)  $6\text{V}$
- (b)  $4\text{V}$
- (c)  $3\text{V}$
- (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)  $1/2$

**Q14.**

Two resistors are placed in gaps of a metre bridge. The balance point is obtained from zero end at  $20\text{cm}$ . A resistor of  $15\Omega$  is in series with smaller of two, the null point shifts to  $40\text{cm}$ . the value of smaller resistor 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  $90^\circ$  from the magnetic meridian is  $n$  times the corresponding work done to turn through an angle of  $60^\circ$ . The value of  $n$  is

- (a)  $1/2$
- (b) 2
- (c)  $1/4$
- (d) 1

**Q16.**

A capacitor of capacity  $2\mu\text{F}$  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 a space of 15 m occupied by uniform field of 1T. Resistance of loop is  $0.25\Omega$ . 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)  $2 \times 10^{-8} \text{ J m}^{-3}$
- (b)  $3 \times 10^{-9} \text{ J m}^{-3}$
- (c)  $1 \times 10^{-8} \text{ J m}^{-3}$
- (d)  $4 \times 10^{-4} \text{ J m}^{-3}$

**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 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  $\theta$ , suffers a deviation of  $22^\circ$ . The Value of angle of refraction in glass is

- (a)  $34^\circ$
- (b)  $22^\circ$
- (c)  $56^\circ$
- (d)  $68^\circ$

**Q22.**

The wavelength of  $k_\alpha$  line produced by an X ray tube is  $0.76 \text{ \AA}$ . 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  $2.2 \times 10^6$  m/s and radius of orbit is  $0.5 \text{ \AA}$ . 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)  $2V$
- (c)  $4V$
- (d)  $-2V$

**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  $A \cup B$ ?

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

**Q2.**

A, B, C be three sets, such that  $A \cup B = A \cup C$  and  $A \cap B = A \cap C$ . 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)  $\operatorname{Re}(z) > 2$
- (b)  $\operatorname{Re}(z) > 3$
- (c)  $\operatorname{Im}(z) = 1$
- (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)  $AB = BA$
- (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)  $4xyz$   
(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  $\frac{1}{1.2} - \frac{1}{2.3} + \frac{1}{3.4} \dots$  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)  $\frac{ac + ab + bc}{b^2 + ac}$   
(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  $1 + (1 + 3) + (1 + 3 + 5) + \dots$  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  $1.3 + 3.5 + 5.7 + \dots$  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.**

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

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

**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)  $\pi$
- (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  $\vec{a} \cdot \vec{b} \neq 0$ ,  $\vec{b} \cdot \vec{c} \neq 0$ . 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  $\sin x \cos x = 2$  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)  $\pi$
- (c)  $\pi / 6$
- (d) None of these

**Q26.**

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

- (a)  $e \log 2$
- (b)  $e$
- (c)  $e^{-1}$
- (d) None of these

**Q27.**

The sum of the series  $\frac{1}{1.2} + \frac{1}{3.4} + \frac{1}{5.6} + \dots$  to  $\infty$  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 exist
- (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.**

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

- (a)  $\pm 1$
- (b) 0
- (c) 1
- (d)  $0, \pm 1$