

Physics

- If the earth stops moving around its polar axis then what will be effect on body placed at south axis?
(a) Remain same
(b) Increase
(c) Decrease but not zero
(d) Decrease zero
- In air the value of the total electric flux emitted from unit positive charge is
(a) ϵ_0
(b) $(\epsilon_0)^{-1}$
(c) $(4\pi\epsilon_0)^{-1}$
(d) $4\pi\epsilon_0$
- A rod AB is 1m long. The temperature of its one end A is maintained at 100°C and other end B at 10°C. The temperature at a distance of 60 cm from point B is
(a) 64°C
(b) 36°C
(c) 46°C
(d) 72°C
- In designing, a beam for its use to support a load. The deflection at centre is directly proportional to (where, Y is Young's modulus)
(a) $\frac{1}{Y}$
(b) $\frac{1}{Y^2}$
(c) $\frac{1}{Y^3}$
(d) $\frac{1}{Y^4}$
- A balloon is filled at 27°C and 1 atm pressure by 500 m³ He. At -3°C and 0.5 atm pressure, the volume of He will be
(a) 700 m³
(b) 900 m³
(c) 1000 m³
(d) 500 m³
- The half-life of radioactive element is 600 yr. The fraction of sample that would remain after 3000 yrs is
(a) $\frac{1}{16}$
(b) $\frac{1}{32}$
(c) $\frac{1}{64}$
(d) $\frac{1}{128}$
- A particle moves along with x -axis. The position x of particle with respect to time t from origin given by $x = b_0 + b_1 t + b_2 t^2$. The acceleration of particle is
(a) b_0
(b) b_1
(c) b_2
(d) $2b_2$
- Root mean square speed of the molecules of ideal gas is v . If pressure is increased two times constant temperature, then the rms speed will become
(a) $\frac{v}{2}$
(b) v
(c) $2v$
(d) $4v$
- 1 mole of gas occupies a volume of 200 ml at 100 mm pressure. What is the volume occupied by two moles of gas at 400 mm pressure and at same temperature?
(a) 50 mL
(b) 100 mL
(c) 200 mL
(d) 400 mL
- A charged particle travels along a straight line with a speed v in a region where both electric field E and magnetic field B are present. It follows that
(a) $|E| = v|B|$ and the two fields are parallel
(b) $|E| = v|B|$ and the two fields are perpendicular
(c) $|B| = v|E|$ and the two fields are parallel
(d) $|B| = v|E|$ and the two fields are perpendicular
- What will be the wave velocity, if the radar gives 54 waves/min and wavelength of the given wave is 10 m?
(a) 4 m/s
(b) 6 m/s
(c) 9 m/s
(d) 5 m/s
- A transformer of 100% efficiency has 200 turns in the primary coil and 4000 turns in secondary coil. It is connected to a 220 V AC.
(a) 11.56 $\times 10^{-4}$ A
(b) 156 $\times 10^{-4}$ A
(c) 1.56 $\times 10^{-4}$ A
(d) 1.56 $\times 10^{-6}$ A
- Two slabs A and B of different materials but of same thickness are joined end to end to form a composite slab. The thermal conductivities of A and B are K_1 and K_2 respectively. A steady temperature difference of 12°C is maintained across the composite slab. If $K_1 = \frac{K_2}{2}$, the temperature difference across slabs A is
(a) 4°C
(b) 6°C
(c) 8°C
(d) 10°C
- In short wave communication waves of which type are reflected by ionosphere layer having electron density 10^{11} per m³?
(a) 2 MHz
(b) 10 MHz
(c) 12 MHz
(d) 18 MHz
- A body of mass 4 kg moving with velocity 12 m/s collides with another body of mass 5 kg at rest. If two bodies stick together after collision, then the loss of kinetic energy of system is
(a) zero
(b) 288 J
(c) 172.8 J
(d) 144 J
- The heat required to increase the temperature of 4 moles of a monoatomic ideal gas from 273 K to 473 K at constant volume is
(a) 200 R
(b) 400 R
(c) 800 R
(d) 1200 R
- A solid sphere rolls without slipping on a rough horizontal surface. The ratio of its rotational kinetic energy and its total kinetic energy is
(a) 2/5
(b) 4/5
(c) 2/7
(d) 3/7
- 6 Ω and 12 Ω resistors are connected in parallel. This combination is connected in series with a 10 V battery and 6 Ω resistor. What is the potential difference between the terminals of the 12 Ω resistor?
(a) 4 V
(b) 16 V
(c) 2 V
(d) 8 V
- Charge passing through a conductor of cross-section area $A = 0.3 \text{ m}^2$ is given by $q = 3t^2 + 5t - 2$ in coulomb, where t is in second. What is the value of drift velocity at $t = 2$? (Given, $n = 2 \times 10^{23} / \text{m}^3$)
(a) $0.77 \times 10^{-5} \text{ m/s}$
(b) $1.77 \times 10^{-5} \text{ m/s}$
(c) $2.08 \times 10^{-5} \text{ m/s}$
(d) $0.57 \times 10^{-5} \text{ m/s}$

Directions (Q. Nos. 41-60) These questions consist of two statements each printed as assertion and reason. While answering these questions you are required to choose any one of the following responses.

- If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) If the Assertion and Reason are true but Reason is not correct explanation of Assertion.
(c) If Assertion is true but Reason is false.
(d) If Assertion is false but Reason is true.
- Assertion** When a body is dropped or thrown horizontally from the same height, it would reach the ground at the same time.
Reason Horizontal velocity has no effect on the vertical direction.
- Assertion** A thermoelectric refrigerator is based on the Peltier effect.
Reason A thermocouple may be used as a radiation detector.
- Assertion** The pattern and position of fringes always remain same even after the introduction of transparent medium in a path of the central fringe is bright or dark depends upon the initial phase difference between the two coherence sources.
- Assertion** Balmer series lies in the visible region of electromagnetic spectrum.
Reason $\frac{1}{\lambda} = R \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$ where, $n = 3, 4, 5, \dots$
- Assertion** Corpuscular theory fails in explaining the velocities of light in air and water.
Reason According to corpuscular theory, light should travel faster in denser medium than in rarer media.
- Assertion** Susceptibility is defined as the ratio of intensity of magnetisation I to magnetic intensity H .
Reason Greater the value of susceptibility smaller the value of intensity of magnetisation I .
- Assertion** It is not possible to have interference between the waves produced by two violins.

- The particle of mass 50 kg is at rest. The work done to accelerate it by 20 m/s in 10 s is
(a) 10^3 J
(b) 10^4 J
(c) $2 \times 10^3 \text{ J}$
(d) $4 \times 10^3 \text{ J}$
- The moment of inertia of a circular loop of radius R_1 at a distance of $R/2$ from a rotating axis parallel to horizontal diameter of loop is
(a) MR^2
(b) $\frac{1}{2} MR^2$
(c) $2MR^2$
(d) $\frac{3}{4} MR^2$
- The ratio of radius of two bubbles is 2:1. What is the ratio excess pressure inside them?
(a) 1:2
(b) 1:4
(c) 1:1
(d) 4:1
- In the capacitor of capacitance C , charge Q and energy W is stored. If charge is increased to $2Q$, the energy stored will be
(a) $\frac{W}{4}$
(b) $\frac{W}{2}$
(c) $2W$
(d) $4W$
- The unit of thermal conductivity is
(a) $\text{Wm}^{-1}\text{K}^{-1}$
(b) JK^{-1}
(c) WmK^{-1}
(d) JK^{-1}
- Photons and electrons are given same energy (10^{-19} J). Wavelength associated with photon and electron are λ_p and λ_e , the correct statement will be
(a) $\lambda_p > \lambda_e$
(b) $\lambda_p < \lambda_e$
(c) $\lambda_p = \lambda_e$
(d) $\frac{\lambda_p}{\lambda_e} = c$
- main supply and secondary feeds to a 100 kV resistance. The potential difference per turn is
(a) 1.1 V
(b) 25 V
(c) 18 V
(d) 11 V
- A thin convex lens of refractive index 1.5 has 20 cm focal length in air. If lens is completely immersed in a liquid of refractive index 1.6, its focal length will be
(a) -160 cm
(b) -100 cm
(c) +10 cm
(d) +100 cm
- SI unit of permittivity is
(a) $\text{C}^2\text{m}^{-2}\text{N}^{-1}$
(b) $\text{C}^2\text{m}^{-2}\text{N}^{-1}$
(c) $\text{C}^2\text{m}^{-2}\text{N}^{-1}$
(d) $\text{C}^{-1}\text{m}^{-2}\text{N}^{-1}$
- A spherical drop of capacitance $1 \mu\text{F}$ is broken into eight drops of equal radius. Then, the capacitance of each small drop is
(a) $\frac{1}{8} \mu\text{F}$
(b) $\frac{1}{4} \mu\text{F}$
(c) $\frac{1}{2} \mu\text{F}$
(d) $8 \mu\text{F}$
- A simple harmonic oscillator consists of a particle of mass m and an ideal spring with spring constant k . The particle oscillates with a time period T . The spring is cut into two equal parts. If one part oscillates with the same particle, the time period will be
(a) $\frac{T}{2}$
(b) $\sqrt{2}T$
(c) $\frac{T}{\sqrt{2}}$
(d) $\frac{T}{2}$
- The coefficient of viscosity for hot air is
(a) greater than the coefficient of viscosity for cold air
(b) smaller than the coefficient of viscosity for cold air
(c) same as the coefficient of viscosity for cold air
(d) increase or decrease depending on the external pressure
- An artificial satellite moving in a circular orbit around the earth has a total (kinetic + potential) energy E_0 . Its potential energy is
(a) $-E_0$
(b) $1.5 E_0$
(c) $2E_0$
(d) E_0
- A marble block of mass 2 kg lying on ice when given a velocity of 6 m/s is stopped by friction in 10 s. Then the coefficient of friction is
(a) 0.01
(b) 0.02
(c) 0.03
(d) 0.06
- A body of mass 0.25 kg is projected with muzzle velocity 100 m/s from a tank of mass 100 kg. What is the recoil velocity of the tank?
(a) 5.5 m/s
(b) 25 m/s
(c) 0.5 m/s
(d) 0.25 m/s
- A rocket with a lift-off mass $3.5 \times 10^6 \text{ kg}$ is blast upward with an initial acceleration of 10 m/s^2 . Then, the initial thrust of the blast is
(a) $1.75 \times 10^7 \text{ N}$
(b) $3.5 \times 10^6 \text{ N}$
(c) $7.0 \times 10^6 \text{ N}$
(d) $14.0 \times 10^6 \text{ N}$
- A step down transformer is used on a 1000 V line to deliver 20 A at 120 V at the secondary coil. If the efficiency of the transformer is 80%, the current drawn from the line is
(a) 3 A
(b) 30 A
(c) 0.3 A
(d) 2.4 A
- What μ minimum is to be applied on X-ray tube so that potential wavelength of emitted X-rays may be 1 \AA ($h = 6.6 \times 10^{-34} \text{ J-s}$)
(a) 12.42 keV
(b) 12.84 keV
(c) 11.98 keV
(d) 10.78 keV
- Hydrogen atom excites energy level from fundamental state to $n = 3$. Number of spectrum lines according to Bohr is
(a) 4
(b) 1
(c) 2
(d) 2
- A black body at a temperature of 2600 K has the wavelength corresponding to maximum emission 1200 \AA . Assuming the moon to be perfectly black body the temperature of the moon, if the wavelength corresponding to maximum emission is 5000 \AA is
(a) 7800 K
(b) 6240 K
(c) 5240 K
(d) 3640 K
- Two similar trains are moving along the equatorial line with the same speed but in opposite directions. They will exert equal pressure on the rails.
Reason In uniform circular motion the magnitude of acceleration remains constant but the direction continuously changes.
- Assertion** A table cloth can be pulled from a table without dislodging the dishes.
Reason To every action there is an equal and opposite reaction.
- Assertion** Soft steel can be made red hot by continued hammering on it, but hard steel cannot.
Reason Energy transfer in case of soft is large as in hard steel.
- Assertion** The centre of mass of an electron and proton, when released moves faster towards proton.
Reason Proton is heavier than electron.
- Assertion** A planet moves faster, when it is closer to the sun in its orbit and vice-versa.
Reason Orbital velocity in orbit of planet is constant.
- Assertion** A large force is required to drawn apart normally two glass plates enclosing a thin water film.
Reason Water works as glue and sticks two glass plates.
- Assertion** The water rises higher in a capillary tube of small diameter than in the capillary tube of large diameter.
Reason Height through which liquid rise in capillary tube inversely proportional to the capillary tube.
- Assertion** If the bob of a simple pendulum is kept in a horizontal electric field, its period of oscillation will remain same.
Reason If bob is charged and kept in horizontal electric field, then the time period will be decreased.
- Reason** For interference of two waves the phase difference between the waves must remain constant.
- Assertion** A metallic shield in the form of a hollow shell may be build to block an electric field.
Reason In a hollow spherical shell, the electric field inside it is zero at every point.
- Assertion** The molecules of a monoatomic gas has three degrees of freedom.
Reason The molecules of a diatomic gas has five degrees of freedom.
- Assertion** To observe diffraction of light the size of aperture should be of the order of 10^{-7} m .
Reason 10^{-7} m is the order of wavelength of visible light.
- Assertion** The resolving power of a telescope is more if the diameter of the objective lens is more.
Reason Objective lens of large diameter collects more light.
- Assertion** A beam of charged particles is employed in the treatment of cancer.
Reason Charged particles on passing through a material medium loss their energy by causing ionisation of the atoms along their path.

Chemistry

- Which one of the following enzymes is present in animals like cow, buffalo etc., to digest compounds like paper, cloth etc?
(a) Urease
(b) Cellulase
(c) Silicase
(d) Sucrase
- Which one of the following is employed as antichistamine?
(a) $\text{H}_2\text{N}-\text{CH}_2-\text{CH}_2-\text{NH}_2$
(b) $\text{H}_2\text{N}-\text{CH}_2-\text{C}(\text{CH}_3)_2-\text{CH}_2-\text{NH}_2$
(c) $\text{H}_2\text{N}-\text{CH}_2-\text{CH}(\text{CN})-\text{NH}_2$
(d) $\text{H}_2\text{N}-\text{CH}(\text{Cl})-\text{NH}_2$
- Etherates are
(a) ethers
(b) solution in ether
(c) complexes of ethers with Lewis acid
(d) complexes of ethers with Lewis base
- IC electricity deposits
(a) 10.8 g of Ag
(b) electrochemical equivalent of Ag
(c) half of electrochemical equivalent of Ag
(d) 96500 g of Ag
- The reduction potential at pH = 14 for the Cu^{2+}/Cu couples is [Given, $E^\circ_{\text{Cu}^{2+}/\text{Cu}} = 0.34 \text{ V}$, $K_{sp}(\text{Cu}(\text{OH})_2) = 1 \times 10^{-19}$]
(a) 0.34 V
(b) -0.34 V
(c) 0.22 V
(d) -0.22 V
- Freon used as refrigerant is
(a) $\text{CF}_2 = \text{CF}_2$
(b) CH_2F_2
(c) CCl_2F_2
(d) CF_4
- Of the following, the oxime of which shows geometrical isomerism is
(a) acetone
(b) diethyl ketone
(c) formaldehyde
(d) benzaldehyde
- Which has the highest nucleophilicity?
(a) F^-
(b) OH^-
(c) $-\text{OCH}_3$
(d) $-\text{NH}_2$
- Which one of the following alkenes will react faster with H_2 under catalytic hydrogenation conditions?
(a) $\text{R}_2\text{C}=\text{CH}_2$
(b) $\text{R}_2\text{C}=\text{C}(\text{R})_2$
(c) $\text{R}_2\text{C}=\text{C}(\text{R})-\text{H}$
(d) $\text{R}_2\text{C}=\text{C}(\text{R})-\text{H}$ ($\text{R} = \text{Allyl}$ substituent)
- For a first order reaction $A \rightarrow B$, the reaction rate at reactant concentration of 0.01 M is found to be $2.0 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$. The half-life period of the reaction is
(a) 220 s
(b) 347 s
(c) 300 s
(d) 30 s
- Which one of the following is the electron deficient molecule?
(a) B_2H_6
(b) C_2H_6
(c) PH_3
(d) SiH_4
- Which one of the following would have a permanent dipole moment?
(a) BF_3
(b) SiF_4
(c) SF_6
(d) XeF_4
- Which one of the following undergoes nucleophilic substitution exclusively by $\text{S}_{\text{N}}1$ mechanism?
(a) Benzyl chloride
(b) Isopropyl chloride
(c) Chlorobenzene
(d) Ethylpropyl chloride
- The rate of reaction between two reactants A and B decreases by a factor of 4, if the concentration of reactant B is doubled. The order of this reaction with respect to reactant B is
(a) -1
(b) -2
(c) 1
(d) 2
- In a face centred cubic lattice, a unit cell is shared equally by how many unit cells?
(a) 8
(b) 4
(c) 2
(d) 6
- A solution of urea (mol. mass 56 g mol⁻¹) boils at 100.18°C at 1 atm. The molal boiling point elevation constant K_b of water is $0.51 \text{ } ^\circ\text{C kg mol}^{-1}$.
(a) $4.91 \times 10^{-2} \text{ mole}^{-1}$
(b) $4.11 \times 10^{-6} \text{ mole}^{-1}$
(c) $8.81 \times 10^{-21} \text{ mole}^{-1}$
(d) $6.26 \times 10^{-21} \text{ mole}^{-1}$
- The pressure and temperature of 4 dm³ of carbon dioxide gas are doubled. Then volume of carbon dioxide would be
(a) 2 dm^3
(b) 3 dm^3
(c) 4 dm^3
(d) 8 dm^3
- Equal volumes of three acid solutions of pH 3, 4 and 5 are mixed in a vessel. What will be the H^+ ion concentration in the mixture?
(a) $1.11 \times 10^{-4} \text{ M}$
(b) $3.7 \times 10^{-4} \text{ M}$
(c) $3.7 \times 10^{-3} \text{ M}$
(d) $1.11 \times 10^{-3} \text{ M}$
- Purple of cassius is a/an
(a) colloidal sol of gold
(b) colloidal sol of silver
(c) colloidal sol of platinum
(d) oxyacid of gold
- Insulin production and its action in human body are responsible for the level of diabetes. This compound belongs to which of the following categories?
(a) A coenzyme
(b) A hormone
(c) A nucleic acid
(d) An antibiotic
- Which base is present in RNA but not in DNA?
(a) Uracil
(b) Cytosine
(c) Guanine
(d) Thymine
- Which one of the following methods is neither meant for the synthesis nor for the purification of amines?
(a) Curtius reaction
(b) Wurtz reaction
(c) Hofmann method
(d) Hinsberg method

- Omeprazole
(b) Chlorpheniridine
(c) Diphenylhydramine
(d) Nortriptyline
- Dunstan's test is used for identification of
(a) glycerol
(b) acetone
(c) glycol
(d) ethane
- Which one of the following structures represents the neoprene polymer?
(a) $\text{H}_2\text{C}=\text{C}(\text{CH}_3)-\text{CH}=\text{CH}_2$
(b) $\text{H}_2\text{C}=\text{C}(\text{CH}_3)-\text{CH}=\text{CH}_2$
(c) $\text{H}_2\text{C}=\text{C}(\text{CH}_3)-\text{CH}=\text{CH}_2$
(d) $\text{H}_2\text{C}=\text{C}(\text{CH}_3)-\text{CH}=\text{CH}_2$
- A reaction occurs spontaneously if
(a) $\Delta S < \Delta H$ and both ΔH and ΔS are +ve
(b) $\Delta S > \Delta H$ and both ΔH and ΔS are +ve
(c) $\Delta S > \Delta H$ and both ΔH and ΔS are -ve
(d) $\Delta S > \Delta H$ and ΔH is +ve and ΔS is -ve
- The aqueous solution containing which one of the following ions will be colourless?
(Atomic number of Sc = 21, Fe = 26, Ti = 22, Mn = 25)
(a) Sc^{3+}
(b) Fe^{2+}
(c) Ti^{3+}
(d) Mn^{2+}
- Four successive members of the first row transition elements are listed below with their atomic numbers. Which one of them is expected to have the highest third ionization enthalpy?
(a) Vanadium ($Z = 23$)
(b) Chromium ($Z = 24$)
(c) Iron ($Z = 26$)
(d) Manganese ($Z = 25$)
- Order of K_f and K_b respectively are 1.86 and 0.52 K kg mol⁻¹ for water, the above solution will freeze at
(a) -6.54°C
(b) 6.54°C
(c) 0.654°C
(d) -0.654°C
- Which one of the following is an inner orbital complex as well as diamagnetic in behaviour?
(Atomic number of Zn = 30, Cr = 24)
(a) $[\text{Zn}(\text{NH}_3)_4]^{2+}$
(b) $[\text{Cr}(\text{NH}_3)_6]^{3+}$
(c) $[\text{Co}(\text{NH}_3)_6]^{3+}$
(d) $[\text{Ni}(\text{NH}_3)_6]^{2+}$
- Electrolytic reduction of nitrobenzene in weakly acidic medium gives
(a) aniline
(b) nitrobenzylamine
(c) N-phenylhydroxylamine
(d) p-phenylenediamine
- Which one of the following oxides is expected to exhibit paramagnetic behaviour?
(a) CO_2
(b) SO_2
(c) ClO_2
(d) NO_2
- The correct order of acid strength is
(a) $\text{HClO} < \text{HClO}_2 < \text{HClO}_3 < \text{HClO}_4$
(b) $\text{HClO} < \text{HClO}_2 < \text{HClO}_3 < \text{HClO}_4$
(c) $\text{HClO}_2 < \text{HClO} < \text{HClO}_3 < \text{HClO}_4$
(d) $\text{HClO}_2 < \text{HClO}_3 < \text{HClO} < \text{HClO}_4$
- In the equation,
 $4\text{M} + 8\text{CN}^- + 2\text{H}_2\text{O} + \text{O}_2 \rightarrow 4[\text{M}(\text{CN})_2]^- + 4\text{OH}^-$
Identify the metal M.
(a) Copper
(b) Iron
(c) Gold
(d) Zinc
- The decomposition of a certain mass of CaCO_3 gives 1.12 dm³ of CO_2 gas at STP. The mass of KOH required to completely neutralise the gas is
(a) 56 g
(b) 28 g
(c) 40 g
(d) 20 g
- The reaction of chloroform with alcoholic KOH and p-toluidine form
(a) $\text{H}_3\text{C}-\text{C}_6\text{H}_4-\text{CN}$
(b) $\text{H}_3\text{C}-\text{C}_6\text{H}_4-\text{N}_2\text{Cl}$
(c) $\text{H}_3\text{C}-\text{C}_6\text{H}_4-\text{NH}-\text{CH}_2\text{Cl}$
(d) $\text{H}_3\text{C}-\text{C}_6\text{H}_4-\text{NC}$
- Pyruvic acid is obtained by
(a) oxidation of acetaldehyde
(b) oxidation of formaldehyde cyanohydrin
(c) oxidation of acetone cyanohydrin
(d) None of the above
- Rate of the reaction,
 $\text{R}-\text{C}(=\text{O})-\text{H} + \text{Nu}^- \rightarrow \text{R}-\text{C}(=\text{O})-\text{Nu}^- + \text{H}^-$
is fastest when Z is
(a) Cl^-
(b) NH_2^-
(c) OC_2H_5^-
(d) $\text{OCOC}_2\text{H}_5^-$
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(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.
- Assertion** Mercury vapour is shining silvery appearance.
Reason Mercury is a metal with shining silvery appearance.
Reason It involves reaction of CO with Hg^{2+} to form volatile carbonyl which decompose on heating to give pure metal.
- Assertion** EDTA is a hexadentate ligand.
Reason EDTA is a ligand is given by number of lone pairs donated to central atom by a lone pair.
- Assertion** Sodium cyanide extract of a salt containing sulphide ions gives a violet colour with appropriate reagent.
Reason The reagent sodium nitroprusside gives violet colour due to the formation of sodium thioionitroprusside.
- Assertion** H_2O_2 under goes disproportionation on heating.
Reason It gives H_2O and O_2 on heating.
- Assertion** IE₁ of nitrogen is lower than that of oxygen.
Reason Across a period effective nuclear charge decreases.
- Assertion** The term anomers of glucose refers to isomers of glucose that differ in configuration at carbon one (C-1).
Reason Anomers of glucose are cyclic diastereomers differ in configuration at C-1 existing in two forms α - and β -respectively.
- Assertion** The presence of nitro group facilitates nucleophilic substitution reactions in aryl halides.
Reason The intermediate carbanion is stabilised due to the presence of nitro group.
- Assertion** Friedel-Crafts' alkylation is not prepared by Friedel-Crafts' alkylation of benzene.
Reason Alkyl halides are less reactive than acyl halides.
- Assertion** Benzyl bromide when kept in acetone water produces benzyl alcohol.
Reason The reaction follows $\text{S}_{\text{N}}2$ mechanism.
- Assertion** Iodobutanol does not give iodoform test.
Reason It does not have α -hydrogen.

Biology

- Energy flow in an ecosystem is
(a) unidirectional
(b) bidirectional
(c) multi-directional
(d) All of these
- Who proposed a five kingdom classification and named kingdom as Monera, Protista, Fungi, Plantae and Animalia?
(a) Herbert Copeland
(b) RH Whittaker
(c) Carl Woese
(d) Carolus Linnaeus
- Which of the following organisms completely lack cell wall, they are the smallest living cells known and can survive without oxygen?
(a) Mycoplasma
(b) Euglenoids
(c) Slime moulds
(d) All of these
- What is the correct order of the stages of cellular respiration?
(a) Krebs' cycle — electron transport — chain — glycolysis
(b) Electron transport chain — Krebs' cycle — glycolysis
(c) Glycolysis — Krebs' cycle — electron transport chain
(d) Glycolysis — electron transport chain — Krebs' cycle
- A mixture containing DNA fragments, a, b, c and d, with molecular weights of $a > b > c$ and $d > c$, was subjected to agarose gel electrophoresis. The positions of the fragments from cathode to anode sides of the gel would be
(a) b, a, c, d
(b) a, b, c, d
(c) c, b, a, d
(d) b, a, d, c
- Which of the following DNA sequences qualifies to be designated as a palindromic?
(a) 5'-GACCG-3' in one strand
(b) 3'-GACCG-5' in one strand
(c) 5'-GACCG-3' in one strand
(d) 5'-AGCGCT-3' in one strand
(e) 5'-AGCGCT-3' in one strand
- ICN stands for
(a) Indian Union for Conservation of Nature
(b) International Union for Conservation of Nature
- Both sickle cell anaemia and Huntington's chorea are
(a) bacterial-related diseases
(b) congenital disorders
(c) pollutant-induced disorders
(d) virus-related diseases
- Which one of the following pairs is not correctly matched?
(a) Vitamin-B₂ — Pernicious anaemia
(b) Vitamin-B₁₂ — Loss of appetite
(c) Vitamin-B₉ — Beri-beri
(d) Vitamin-B₆ — Pellagra
- The exchange of segments of non-sister chromatids between chromosomes of a homologous pair termed as
(a) transformation
(b) translocation
(c) crossing over
(d) chromosomal aberration
- Which is known for its contribution to the understanding of
(a) transcription
(b) translation
(c) DNA replication
(d) mutation
- The beginning of understanding genetic transformation in bacteria was made by
(a) Frederick Griffith
(b) Hershey and Chase
(c) Watson and Crick
(d) TM Morgan
- The source of Taq polymerase used in PCR is a
(a) thermophilic fungus
(b) mesophilic fungus
(c) thermophilic bacterium
(d) halophilic bacterium
- A pea plant parent having violet-coloured flowers with unknown genotype was crossed with a plant having white-coloured flowers. In the progeny, 50% of the flowers were violet and 50% were white. The genotypic constitution of the parent having violet-coloured flowers was
(a) homozygous
(b) heterozygous
(c) heterozygous
(d) hemizygous
- Fluid mosaic model of plasma membrane was given by
(a) Robertson
(b) Robert Hooke
(c) Singer and Nicholson
(d) Gorter and Grendel
- Cell respiration is carried out by
(a) ribosome
(b) mitochondria
(c) chloroplast
(d) Golgi bodies
- In the lac operon model, lactose molecules function as
(a) inducers, which bind with the operator gene
(b) repressors, which bind with the operator gene
(c) inducers, which bind with the repressor protein
(d) corepressors, which bind with repressors protein
- A recessive mutant is one which is
(a) not expressed
(b) rarely expressed
(c) expressed only in homozygous and hemizygous state
(d) expressed only in heterozygous state
- Humoral immunity system is mediated by
(a) B-cells
(b) T-cells
(c) NK-cell
(d) plasma cells
- Two pea plants having red (dominant) coloured flowers with unknown genotypes are crossed, 75% of the flowers are red and 25% are white. The genotypic constitution of the parent having red coloured flowers will be
(a) both homozygous
(b) one homozygous and other heterozygous
(c) both heterozygous
(d) both hemizygous
- If the total amount of adenine and thymine in a double-stranded DNA is 60%, the amount of guanine in this DNA will be
(a) 15%
(b) 20%
(c) 30%
(d) 40%
- Assertion** Allelopathy is a form of amensalism that occurs in plants.
Reason Association of rooting plants with fungal hyphae is an important example allelopathy.
- Assertion** Bats and whales are classified as mammals.
Reason Bats and whales have four chambered heart.
- Assertion** Histamine is related with allergic and inflammatory reactions.
Reason Histamine is a vasodilator.
- Assertion** For a recipient to receive blood from a donor, the recipient's plasma must not have an antibody, cause the donor's cells to agglutinate.
Reason The possibility of blood clumping does not depend on anti A and anti B antibody in blood type.
- Assertion** Monocot stem has collateral open vascular bundle.
Reason Open vascular bundle is without vascular cambium.
- Assertion** Presence of flavin nucleotide is essential for the activity of some enzymes.
Reason Flavine nucleotide is an activator of these enzyme.
- Assertion** Due to excessive use of fertilizers, the available water to the plants becomes hypotonic in relation to cell sap.
Reason If the water molecules as a result diffuse out of the cells due to endosmosis.
- Assertion** The nuclear envelope acts as an interface between the genetic component of the cell and the cytoplasm.
Reason It thus protects DNA against the mutagenic effect of cytoplasmic enzyme.
- Assertion** Waxy cuticle coating plant parts reduce the transpiration.
Reason These adaptation are found in xerophytes.

- Indian Union for Chemical Nomenclature
(d) International Union for Conservation of Nutrients
- Tendrils in plants are an example of
(a) convergent evolution
(b) radiation
(c) divergent evolution
(d) co-evolution
- Haemoglobin is
(a) an oxygen carrier in human blood
(b) a protein used as food supplement
(c) an oxygen scavenger in root nodules
(d) a plant protein with highly lysine content
- Stomatal opening is affected by
(a) nitrogen concentration, carbon dioxide concentration and light
(b) carbon dioxide concentration, temperature and light
(c) nitrogen concentration, light and temperature
(d) carbon dioxide concentration, nitrogen concentration and temperature
- Taxonomic hierarchy refers to
(a) step-wise arrangement of all categories for classification of plants and