

PHYSICS

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- 1) Dimensions ($ML^{-1} T^{-1}$) are related to
- a) torque b) work
c) energy d) coefficient of viscosity
- 2) A body is moved along a straight line by a machine delivering a constant power. The distance moved by the body in time 't' is proportional to
- a) $t^{3/4}$ b) $t^{3/2}$
c) $t^{1/4}$ d) $t^{1/2}$
- 3) A constant power P is applied to a particle of mass m. The distance travelled by the particle when its velocity increases from v_1 to v_2 is (neglect friction)
- a) $\frac{m}{3P}(v_2^3 - v_1^3)$ b) $\frac{m}{3P}(v_2 - v_1)$
c) $\frac{3P}{m}(v_2^2 - v_1^2)$ d) $\frac{m}{3P}(v_2^2 - v_1^2)$
- 4) A force is required to break a wire of length l and radius r. What force is required to break a wire, of same material having twice the length and six times the radius?
- a) F b) 3F
c) 9F d) 36F
- 5) At time $t = 0$ a particle starts moving along the x-axis if its kinetic energy increases uniformly with time 't' the net force acting on it must be proportional to
- a) Constant b) t
c) $\frac{1}{\sqrt{t}}$ d) \sqrt{t}
- 6) A particle of mass 100 g is thrown vertically upwards with a speed of 5 m/s. The work done by the force of gravity during the time the particle goes up is
- a) -0.5 J b) -1.25 J
c) 1.25 J d) 0.5 J
- 7) A particle of mass 0.2 kg is moving in one dimension under a force that delivers a constant power 0.5 W to the particle. If the initial speed (in ms^{-1}) after 5 s is.
- a) 0.8 m/s b) 4 m/s
c) 3.6 m/s d) 5 m/s
- 8) A bomb of mass 3.0 kg explodes in air into two pieces of masses 2.0 kg and 1.0 kg. The smaller mass goes at a speed of 80 m/s. The total energy imparted to the two fragments is
- a) 1.07 kJ b) 2.15 kJ
c) 2.4 kJ d) 4.8 kJ
- 9) A round disc of moment of inertia I_2 about its axis perpendicular to its plane and passing through its centre is placed over another disc of moment of inertia I_1 rotating with an angular velocity ω about the same axis. The final angular velocity of the combination of discs is
- a) $\frac{I_2\omega}{I_1 + I_2}$ b) ω
c) $\frac{I_2\omega}{I_1 - I_2}$ d) $\frac{(I_1 + I_2)\omega}{I_1}$
- 10) Gravitational acceleration on the surface of a planet is $\frac{\sqrt{6}}{11}g$. Where g is the gravitational acceleration on the surface of the earth. The average mass density of the planet is $\frac{2}{3}$ times that of the earth. If the escape speed on the surface of the earth is taken to be 11 kms^{-1} , the escape speed on the surface of the planet in kms^{-1} will be
- a) 4 b) 6
c) 3 d) 5
- 11) Two bodies of masses m and 4 m are placed at a distance r. The gravitational potential at a point on the line joining them where the gravitational field is zero :
- a) $-\frac{4Gm}{r}$ b) $-\frac{6Gm}{r}$
c) $-\frac{9Gm}{r}$ d) Zero

Space for Rough Work

- 12) If a ball of steel (density $\rho = 7.8 \text{ g cm}^{-3}$) attains a terminal velocity of 10 cm s^{-1} when falling in water (co-efficient of viscosity $\eta_{\text{water}} = 8.5 \times 10^{-4} \text{ pa.s}$), then its terminal velocity in glycerine ($\rho = 1.2 \text{ g cm}^{-3}$, $\eta = 13.2 \text{ Pa.s}$) would be nearly
- $6.25 \times 10^{-4} \text{ cm s}^{-1}$
 - $6.25 \times 10^{-4} \text{ cm s}^{-1}$
 - $1.5 \times 10^{-5} \text{ cm s}^{-1}$
 - $1.6 \times 10^{-5} \text{ cm s}^{-1}$
- 13) Two wires are made of the same material and have the same volume. However wire 1 has cross-sectional area A and wire 2 has cross-sectional area $3A$. If the length of wire 1 increases by Δx on the applying force F , how much force is needed to stretch wire 2 by the same amount ?
- $4 F$
 - $6 F$
 - $9 F$
 - F
- 14) 0.8 J work is done in rotating a magnet by 60° , placed parallel to a uniform magnetic field. How much work is done in rotating it 30° further ?
- $0.8 \times 107 \text{ erg}$
 - 0.8 erg
 - 8 J
 - 0.4 J
- 15) A spherical body of area A and emissivity $e = 0.6$ is kept inside a perfectly black body. Total heat radiated by the body at temperature T
- $0.4 AT^4$
 - $0.8 AT^4$
 - $0.6 AT^4$
 - $1.0 AT^4$
- 16) The average translational kinetic energy of O_2 (relative molar mass 32) molecules at a particular temperature is 0.048 eV . The translational kinetic energy of N_2 (relative molar mass 28) molecules in eV at the same temperature is :
- 0.0015
 - 0.003
 - 0.048
 - 0.768
- 17) A planet in a distant solar system is 10 times more massive than the earth and its radius is 10times smaller. Given that the escape velocity from the earth is 11 km s^{-1} , the escape velocity from the surface of the planet would be
- 1.1 km s^{-1}
 - 11 km s^{-1}
 - 110 km s^{-1}
 - 0.11 km s^{-1}
- 18) The Speed of sound in oxygen (O_2) at a certain temperature is 460 ms^{-1} . The speed of sound in helium (He) at the same temperature will be (assume both gases to be ideal)
- 1421 ms^{-1}
 - 500 ms^{-1}
 - 650 ms^{-1}
 - 330 ms^{-1}
- 19) 100 g of water is heated from 30°C to 50°C . Ignoring the slight expansion of the water, of the water, the change in its internal energy is (specific heat of water is 4184 J/kg/K)
- 8.4 kJ
 - 84 kJ
 - 2.1 kJ
 - 4.2 kJ
- 20) A particle of mass m executes simple harmonic motion with amplitude a and frequency v . The average kinetic energy during its motion from the position of equilibrium to the end is
- $2\pi^2 ma^2 v^2$
 - $\pi^2 ma^2 v^2$
 - $1/4 ma^2 v^2$
 - $4\pi^2 ma^2 v^2$
- 21) If x , v and a denote the displacement, the velocity and the acceleration of a particle executing simple harmonic motion of time period T , then, which of the following does not change with time?
- aT/x
 - $aT + 2\pi v$
 - aT/v
 - $a^2 T^2 + 4\pi^2 v^2$
- 22) A cylindrical tube open at both ends, has a fundamental frequency, f , in air. The tube is dipped vertically in water so that half of its is in water. The fundamental frequency of the air-column is now:
- f
 - $f/2$
 - $3f/4$
 - $2f$

- 23) The potential difference in open circuit for a cell is 2.2 V. When a 4Ω resistor is connected between its two electrodes the potential difference becomes 2 V. The internal resistance of the cell will be
- a) 1Ω b) 0.2Ω
 c) 2.5Ω d) 0.4Ω
- 24) We wish to see inside an atom. Assuming the atom to have diameter of 100 pm, this means that one must be able to resolve a width of say 10 pm. If an electron microscope is used, the minimum electron energy required is about
- a) 1.5 keV b) 15 keV
 c) 150 keV d) 1.5 MeV
- 25) Three concentric metallic spherical shells of radii $R, 2R, 3R$, are given charge Q_1, Q_2, Q_3 , respectively. It is found that the surface charge densities on the outer surfaces of the shells are equal. Then, the ratio of the charges given to the shells $Q_1 : Q_2 : Q_3$ is
- a) 1 : 2 : 3 b) 1 : 3 : 5
 c) 1 : 4 : 9 d) 1 : 8 : 18
- 26) Capacitance of a capacitor made by a thin metal foil is $2\mu\text{F}$. If the foil is folded with paper of thickness 0.15 mm, dielectric constant of paper is 2.5 and width of paper is 400 mm, the length of the foil will be
- a) 0.34m b) 1.33 m
 c) 13.4 m d) 33.9
- 27) A sheet of aluminium foil of negligible thickness is introduced between the plates of a capacitor. The capacitance of the capacitor.
- a) decreases
 b) remains unchanged
 c) becomes infinite
 d) increases
- 28) An electric wire of resistance R carries a current I . When a magnetic field is applied perpendicular to the wire, the
- a) current I will decrease
 b) current I will increase
 c) resistance R will increase
 d) resistance R will decrease
- 29) A beam of a proton with a velocity 4×10^5 m/sec enters a uniform magnetic field of 0.3 tesla at an angle of 60° to the magnetic field. Find the radius of the helical path taken by the proton beam.
- a) 0.05 m b) 0.12 m
 c) 0.021 m d) 0.012 m
- 30) A particle of mass m and charge q is moving in a region where uniform, constant electric and magnetic fields E and B are present. E and B are parallel to each other. At time $t = 0$, the velocity v_0 of the particle is perpendicular to E . (Assume that its speed is always $\ll c$, the speed of light in vacuum.) Find the velocity v of the particle at time t .
- a) $\vec{v}_0 \cos\left(\frac{qBt}{m}\right) + \vec{E} \frac{qt}{m} + \frac{(\vec{v}_0 \times \vec{B})}{B} \sin\left(\frac{qBt}{m}\right)$
 b) $\vec{v}_0 \cos\left(\frac{qBt}{m}\right) + \vec{E} \frac{qt}{m} - \frac{(\vec{v}_0 \times \vec{B})}{B} \sin\left(\frac{qBt}{m}\right)$
 c) $\vec{v}_0 \cos\left(\frac{qt}{Bm}\right) + \vec{E} \frac{qt}{m} - \frac{(\vec{v}_0 \times \vec{B})}{B} \sin\left(\frac{qBt}{m}\right)$
 d) $\vec{v}_0 \cos\left(\frac{qBt}{m}\right) + \vec{E} \frac{qt}{m} - \frac{(\vec{v}_0 \times \vec{B})}{B} \sin\left(\frac{qt}{Bm}\right)$
- 31) A moving coil galvanometer has 48 turns and area of coil is $4 \times 10^{-2} \text{m}^2$. If the magnetic field is 0.2 T, then to increase the current sensitivity by 25% without changing area (A) and field (B) the number of turns should become
- a) 24 b) 36
 c) 60 d) 54
- 32) Two identical conducting wires AOB and COD are placed at right angles to each other. The wire AOB carries an electric current I_1 and COD carries a current I_2 . The magnetic

field on a point lying at a distance d from O , in a direction perpendicular to the plane of the wires AOB and COD , will be given by

- a) $\frac{\mu_0}{2\pi d}(I_1^2 + I_2^2)$ b) $\frac{\mu_0}{2\pi}\left(\frac{I_1 + I_2}{d}\right)^2$
 c) $\frac{\mu_0}{2\pi d}(I_1^2 + I_2^2)^{\frac{1}{2}}$ d) $\frac{\mu_0}{2\pi d}(I_1 + I_2)$

33) A long straight wire of radius a carries a steady current i . The current is uniformly distributed across its cross section. The ratio of the magnetic field at $a/2$ and $2a$ is

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

34) What is self inductance of a coil when a charge of current from 0 to $2A$ in 0.05 second induces an emf of $40 V$ in it

- a) $1H$ b) $2H$
 c) $3H$ d) $4H$

35) A fully charged capacitor C with initial charge q_0 is connected to a coil of self inductance L at $t = 0$. The time at which the energy is stored equally between the electric and magnetic field.

- a) $\frac{\pi}{4}\sqrt{LC}$ b) $2\pi\sqrt{LC}$
 c) \sqrt{LC} d) $\pi\sqrt{LC}$

36) The flux linked with a circuit is given by $\phi = t^3 + 3t - 7$. The graph between time (x-axis) and induced emf (y-axis) will be

- a) a straight line through the origin
 b) straight line with positive intercept
 c) straight line with negative intercept
 d) parabola not through origin

37) The intensity of radiation emitted by two stars A and B are in the ratio of $16 : 1$. The wavelength corresponding to their peak emission of radiation will be in the ratio of

- a) $2 : 1$ b) $4 : 1$
 c) $1 : 2$ d) $16 : 1$

38) A square of side 3 cm is located at a distance 25 cm from a concave mirror of focal length 10 cm. The centre of square is at the axis of mirror. The area enclosed by the image of the square is

- a) 4 cm^2 b) 6 cm^2
 c) 16 cm^2 d) 36 cm^2

39) A spherical black body with a radius of 12 cm radiates $450 W$ power at $500 K$. If the radius were halved and temperature be doubled, the power radiated in watt would be

- a) 1800 b) 900
 c) 3600 d) 850

40) The wavelengths of the lines emitted in the Lyman series of the spectrum of hydrogen atom correspond to transitions between energy levels and total quantum numbers

- a) $n = 3$ to $n = 1$
 b) $n = 3$ to $n = 2$
 c) $n = 4$ to $n = 1$
 d) $n = 4$ to $n = 2$

41) The work function of sodium is 2.3 eV . The threshold wavelength of sodium will be

- a) 2900 \AA b) 2500 \AA
 c) 5380 \AA d) 2000 \AA

42) A radio transmitter operator at a frequency of 880 kHz and power of 10 kW . The number of photons emitted per second is

- a) 13.27×10^4 b) 13.27×10^{34}
 c) 1327×10^{34} d) 1.71×10^{31}

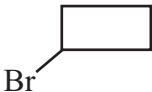
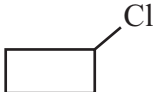


43) An electron, in a hydrogen-like atom, is in an excited state. It has a total energy of -3.4 eV . Calculate. The kinetic energy and the de Broglie wavelength of the electron

- a) 3.4 eV & $0.66 \times 10^{-9} \text{ m}$
 b) 4.3 eV & $0.88 \times 10^{-8} \text{ m}$
 c) 2 eV & $1 \times 10^{-9} \text{ m}$
 d) 6.5 eV & $0.5 \times 10^{-6} \text{ m}$

- 44) As the beam enters the medium, it will
a) diverge
b) converge
c) diverge near the axis and converge near the periphery
d) travel as a cylindrical beam
- 45) The initial shape of the wavefront of the beam is
a) convex
b) concave
c) convex near the axis and concave
d) planar
- 46) The speed of the light in the medium is
a) minimum of the axis of the beam
b) the same everywhere in the beam
c) directly proportional to the intensity I
d) maximum on the axis of the beam
- 47) The rms value of the electric field of the light coming from the sun is 720 N/C. The average total energy density of electromagnetic wave is
a) $4.58 \times 10^{-6} \text{ J/m}^3$ b) $6.37 \times 10^{-9} \text{ J/m}^3$
c) $81.35 \times 10^{-12} \text{ J/m}^3$ d) $3.3 \times 10^{-3} \text{ J/m}^3$
- 48) If an electron jumps from the 4th orbit to the 2nd orbit of hydrogen atom, then the frequency of emitted radiation in the hertz will be (Take Rydberg's constant, $R = 10^5 \text{ cm}^{-1}$)
a) $3/4 \times 10^{15}$ b) $3/16 \times 10^5$
c) $3/16 \times 10^{15}$ d) $9/16 \times 10^{15}$
- 49) In a common base mode of a transistor, the collector current is 5.488 mA for an emitter current of 5.60 mA. The value of the base current amplification factor (β) will be
a) 49 b) 50
c) 51 d) 48
- 50) In a nuclear reaction ^{235}U undergoes fission liberating 200 MeV of energy. The reactor has a 10% efficiency and produced 1000 MW power. If the reactor is to function for 10 years, find the total mass of uranium required.
a) 38451 kg b) 38466 kg
c) 38441 kg d) 37456 kg

- (3) $K_p = Q$ (iii) Spontaneous & endothermic
 (4) $T > \frac{\Delta H}{\Delta S}$ (iv) Spontaneous
- | | | | |
|----------|------|-------|-------|
| (1) | (2) | (3) | (4) |
| a) (ii) | (i) | (iv) | (iii) |
| b) (i) | (ii) | (iii) | (iv) |
| c) (iii) | (iv) | (ii) | (i) |
| d) (iv) | (i) | (ii) | (iii) |
63. One mole of an ideal gas at 300K is expanded isothermally from an initial volume of 1 litre to 10 litres. The ΔE for this process is ($R=2 \text{ cal. mol}^{-1} \text{ K}^{-1}$)
 a) 163.7 cal b) zero
 c) 1381.1 cal d) 9 lit.atm
64. The vapour pressure of solvent decrease by 10mm of mercury when a non volatile solute was added to the solvent. The mole fraction of the solute in the solution is 0.2. What should be the mole fraction of the solvent if the decrease in the vapour pressure is to be 20mm of mercury?
 a) 0.8 b) 0.6
 c) 0.4 d) 0.2
65. A solution contains 1.2046×10^{24} hydrochloric acid molecules in 1 dm^3 of the solution. The strength of the solution is
 a) 6N b) 2N
 c) 4N d) 8N
66. At 25°C , the dissociation of a base, BOH, is 1.0×10^{-12} . The concentration of hydroxyl ions in 0.01 M aqueous solution of the base would be
 a) $1.0 \times 10^{-5} \text{ mol L}^{-1}$
 b) $1.0 \times 10^{-6} \text{ mol L}^{-1}$
 c) $2.0 \times 10^{-6} \text{ mol L}^{-1}$
 d) $1.0 \times 10^{-7} \text{ mol L}^{-1}$
67. Which of the following solution will have pH close to 1.0?
 a) 100 ml of (M/10)HCL + 100 ml (M/10) NaOH
 b) 55 ml of (M/10)HCL + 45 ml (M/10)NaOH
 c) 10 ml of (M/10)HCL + 90 ml (M/10) NaOH
 d) 75 ml of (M/5)HCL + 25 ml (M/5) NaOH
68. Zn gives H_2 gas with H_2SO_4 and HCL but not with HNO_3 because
 a) Zn acts as oxidizing agent when it reacts with HNO_3
 b) HNO_3 is weaker acid than H_2SO_4 and HCL
 c) In electrochemical series, Zn is above hydrogen
 d) NO_3^- is reduced in preference to hydronium ion
69. $\text{Cu}^{2+} + \text{Ag} \longrightarrow \text{Cu} + \text{Ag}^+$ oxidation half-reaction is
 a) $\text{Cu}^{2+} \longrightarrow \text{Cu}$
 b) $\text{Ag} \longrightarrow \text{Ag}^+$
 c) $\text{Cu} \longrightarrow \text{Cu}^{2+}$
 d) All of these
70. The temperature dependence of rate constant (k) of a chemical reaction is written in terms of Arrhenius equation $k = A e^{-E_a/RT}$. Activation energy (E_a) of the reaction can be calculated by plotting
 a) $\log k$ vs T b) $\log k$ vs $1/T$
 c) k vs T d) k vs $1/\log T$
71. In the reaction
 $\text{BrO}_3^- (\text{aq}) + 5\text{Br}^- (\text{aq}) + 6\text{H}^+ \rightarrow 3\text{Br}_2 (\text{l}) + 3\text{H}_2\text{O} (\text{l})$
 The rate of appearance of bromine (Br_2) is related to rate of disappearance of the bromide ions as following
 a) $\frac{d[\text{Br}_2]}{dt} = -\frac{3}{5} \frac{d[\text{Br}^-]}{dt}$
 b) $\frac{d[\text{Br}_2]}{dt} = \frac{5}{3} \frac{d[\text{Br}^-]}{dt}$
 c) $\frac{d[\text{Br}_2]}{dt} = -\frac{5}{3} \frac{d[\text{Br}^-]}{dt}$
 d) $\frac{d[\text{Br}_2]}{dt} = \frac{3}{5} \frac{d[\text{Br}^-]}{dt}$

72. According to the adsorption theory of catalysis, the speed of the reaction increases because-
- Adsorption lowers the activation energy of the reaction
 - The concentration of reactant molecules at the active centers of the catalyst becomes high due to strong adsorption
 - In the process of adsorption, the activation energy of the molecules becomes large
 - Adsorption produces heat which increases the speed of the reaction
73. The protecting power of lyophilic colloidal sol is expressed in terms of:
- Coagulation value
 - Gold number
 - Critical miscelle concentration
 - Oxidation number
74. Among the following, the number of elements showing only one non-zero oxidation state is O, Cl, F, N, P, Sn, Tl, Na, Ti
- 1
 - 2
 - 3
 - 4
75. Total number of rare earth element is
- 8
 - 32
 - 14
 - 10
76. Which of the following pair of metals is purified by van arkel method?
- Ni and Fe
 - Ga and In
 - Zr and Ti
 - Ag and Au
77. Among the following statements, the incorrect one is
- Calamine and siderite are carbonates
 - Argentite and cuprite are oxide
 - Zinc blende and pyrites are sulphides
 - Malachite and azurite are ores of copper
78. The hydride ion, H^- is a stronger base than the hydroxide ion, OH^- . which of the following reactions will occur if sodium hydride (NaH) is dissolved in water?
- $H^-(aq) + H_2O(l) \rightarrow H_3O^-(aq)$
 - $H^-(aq) + H_2O(l) \rightarrow OH^-(aq) + H_2(g)$
 - $H^-(aq) + H_2O(l) \rightarrow OH^-(aq) + 2H^+(aq) + 2e^-$
 - $H^-(aq) + H_2O(l) \rightarrow$ No reaction
79. The formula of exhausted permutit is
- $CaAl_2Si_2O_8 \cdot xH_2O$
 - $Na_2Al_2Si_2O_8 \cdot xH_2O$
 - $CaB_2Si_2O_8 \cdot xH_2O$
 - $K_2Al_2Si_2O_8 \cdot xH_2O$
80. The alkali metals form salt-like hydride by the direct synthesis at elevated temperature. The thermal stability of these hydrides decreases in which of the following order?
- $CsH > RbH > KH > NaH > LiH$
 - $KH > NaH > LiH > CsH > RbH$
 - $NaH > LiH > KH > RbH > CsH$
 - $LiH > NaH > KH > RbH > CSH$
81. The main product obtained when a solution of sodium carbonate reacts with mercuric chloride is
- $Hg(OH)_2$
 - $HgCO_3 \cdot HgO$
 - $HgCO_3$
 - $HgCO_3 \cdot Hg(OH)_2$
82. Which one of the following is the correct statement?
- Boric acid is a protonic acid
 - Beryllium exhibits coordination number of six
 - Chlorides of both beryllium and aluminium have bridged chloride structures in solid phase
 - $B_2H_6 \cdot 2NH_3$ is known as inorganic benzene
83. Glass reacts with HF to produce
- SiF_4
 - H_2SiF_6
 - H_2SiO_3
 - Na_3AlF_6
84. The transition element have a general electronic configuration
- ns^2, np^6, nd^{1-10}
 - $(n-1)d^{1-10}, ns^{0-2}, np^{0-6}$
 - $(n-1)d^{1-10}, ns^{1-2}$
 - nd^{1-10}, ns^{-2}

85. Identify the correct statement of the following
- Lanthanoid contraction is the accumulation of successive shrinkages
 - As a result of lanthanoid contraction, the properties of 4d series of the transition elements have no similarities with the 5d series of elements
 - Shielding power of 4f electrons is quite weak.
 - There is a decrease in the radii of the atoms or ions as one proceeds from La to Lu
86. The ionization isomer of $[\text{Cr}(\text{H}_2\text{O})_4 \text{Cl}(\text{NO}_2)\text{C}]$ is
- $[\text{Cr}(\text{H}_2\text{O})_4 (\text{O}_2\text{N})\text{Cl}_2]$
 - $[\text{Cr}(\text{H}_2\text{O})_4 \text{Cl}_2] (\text{NO}_2)$
 - $[\text{Cr}(\text{H}_2\text{O})_4 \text{Cl}(\text{ONO})\text{Cl}]$
 - $[\text{Cr}(\text{H}_2\text{O})_4 \text{Cl}_2 (\text{NO}_2)] \cdot \text{H}_2\text{O}$
87. The hypothetical complex chlorodiaquotrimmine cobalt (III) chloride can be represented as
- $[\text{CoCl}(\text{NH}_3)_3 (\text{H}_2\text{O})_2] \text{Cl}_2$
 - $[\text{Co}(\text{NH}_3)_3 (\text{H}_2\text{O})\text{Cl}_3]$
 - $[\text{Co}(\text{NH}_2)_3 (\text{H}_2\text{O})_2 \text{Cl}]$
 - $[\text{Co}(\text{NH}_3)_3 (\text{H}_2\text{O})_3] \text{Cl}_3$
88. Roasting of sulphides gives the gas X as a by product. This is colorless gas with choking smell of burnt sulphur and caused great damage to respiratory organs as a result of acid rain. Its aqueous solution is acidic, acts as a reducing agent and its has never been isolated. The gas X is:
- SO_2
 - Co_2
 - SO_3
 - H_2S
89. The process of 'eutrophication' is due to
- Increase in concentration of insecticide in water
 - Increase in concentration of fluoride ion in water.
 - The reduction in concentration of the dissolved oxygen in water due to phosphate pollution in water
 - Attack of younger leaves of a plant by peroxyacetyl nitrate
90. The maximum Number of isomers for an alkene with the molecular formula C_4H_8 is
- 2
 - 3
 - 4
 - 5
91. What would be the product formed when 1-bromo-3-chlorocyclobutane react with two equivalents of metallic sodium in ether?
- 
 - 
 - 
 - 
92. The major product obtain on treatment of $\text{CH}_3\text{CH}_2\text{CH}(\text{F})\text{CH}_3$ with $\text{CH}_3\text{O}^-/\text{CH}_3\text{OH}$ is
- $\text{CH}_3\text{CH}_2\text{CH}(\text{OCH}_3)\text{CH}_3$
 - $\text{CH}_3\text{CH}=\text{CHCH}_3$
 - $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$
 - $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OCH}_3$
93. Compound 'A' (Molecular formula $\text{C}_3\text{H}_8\text{O}$) is treated with acidified potassium dichromate a product 'B' (Molecular formula $\text{C}_3\text{H}_6\text{O}$). 'B' forms a shining silver mirror on warming with ammonical silver nitrate. 'B' when treated with an aqueous solution of $\text{H}_2\text{NCONHNH}_2$, HCL and sodium acetate gives a product 'C' identify the structure of 'C'.
- $\text{CH}_3\text{CH}_2\text{CH}=\text{NNHCONH}_2$
 - $\text{CH}_3-\text{C}=\text{NNHCONH}_2$
|
 CH_3
 - $\text{CH}_3-\text{C}=\text{NCONHNH}_2$
|
 CH_3
 - $\text{CH}_3\text{CH}_2=\text{NCONHNH}_2$
94. Write the structure of the foul smelling compound obtained when aniline is treated with chloroform in the presence of KOH .
- PhNC
 - PhCl
 - PhOH
 - PhNO_3

95. Which of the following statement is not true?
- The vulcanization, the formation of sulphur bridges between different chain make rubber harder and stronger.
 - Natural rubber has the trans configuration at every double bond
 - Buna-S is a copolymer of butadiene and styrene.
 - Natural rubber is a 1,4-polymer of isoprene.
- 96) Structure of some common polymer are given. Which one is not correctly presented?
- Teflon $-(CF_2-CF_2)_n-$
 - Neoprene $\left(CH_2-C(CH_2)=CH-CH_2-CH_2 \right)_n$
 $\quad \quad \quad |$
 $\quad \quad \quad Cl$
 - Terylene $\left(OC-C_6H_4-COOCH_2-CH_2O \right)_n$
 - Nylon-66 $-(NH(CH_2)_6NHCO(CH_2)_4-CO)_2-$
- 97) A certain compound gives negative test with ninhydrin and positive test with benedict's solution. The compound is
- protein
 - monosaccharide
 - lipid
 - amino acid
- 98) Which of the following is correct about H bonding in nucleotide?
- A---A and T---T
 - G---T and A---C
 - A---G and T---C
 - A---T and G---C
- 99) Which of the following is pheromone?
- Linalool
 - Disparlure
 - BHA
 - Alifame
100. The statement which is not correct, is
- Chlorophyll is responsible for the synthesis of carbohydrates in plants
 - The compound formed by the addition of oxygen to haemoglobin is called oxyhaemoglobin
 - acetyl salicylic acid is known as aspirin
 - the metal ion present in vitamin B₁₂ is Mg²⁺

BIOLOGY

11

- 101) **Assertion** : A morphology based approach to taxonomy called “Alpha taxonomy” and it is old fashioned.
Reason : A multi-disciplinary approach to taxonomy called “Omega taxonomy” is favoured in recent years, as it excluded morphological features
- 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) Assertion is false but Reason is true
- 102) Tautonym is
- a) unscientific explanation of a phenomenon
b) common name used as a scientific name
c) nonlatinised name
d) same name for genus and species
- 103) Thermococcus, Methanococcus and Methanobacterium exemplify
- a) archaeobacteria that contains protein homologous to eukaryotic core histones
b) archaeobacteria that lack any histones resembling those found in eukaryotes but whose DNA is negatively supercoiled
c) bacteria whose DNA is relaxed or positively supercoiled but, which have a cytoskeleton as well as mitochondria
d) bacteria that contains a cytoskeleton and ribosomes
- 104) Protists are
- I. unicellular and prokaryote
II. unicellular and eukaryote
III. multicellular and eukaryote
IV. autotroph or heterotroph
- a) I, II and II b) II, III and IV
c) III and IV d) II and IV
- 105) Which of the following is correct regarding plasma membrane?
- a) It is fluid mosaic but impermeable
b) It is permeable but does not show fluid mosaic pattern
c) It is fluid mosaic and selectively permeable
d) It is semipermeable but does not show fluid mosaic pattern
- 106) In a diploid cell, at which stage of cell cycle , the amount of DNA is doubled?
- a) G₁ and G₂ phase b) G₀ phase
c) S, G₂ and M phase d) S phase
- 107) What is diapedesis?
- a) A kind of amoeboid movement
b) The process of filtration of urea in kidney
c) A type of locomotion found in hydra
d) Migration of WBCs into the tissue spaces from blood capillaries
- 108) Which of the following is not a concept of Lamarck?
- a) Environmental pressure causes variation
b) Rate and survival of organism is different due to variation
c) Inheritance of acquired characters
d) If an organ is used constantly it will continuously increase its size
- 109) **Assertion** : Extra oxygen consumption in human body is known as oxygen debt.
Reason : The extra oxygen is required by the body to oxidize accumulated lactic acid produced during strenuous exercise.
- a) Both assertion and reason are true and reason is correct explanation of assertion
b) Both assertion and reason are true but reason is not correct explanation of assertion
c) Assertion is true reason is false
d) Both Assertion and reason are false
- 110) Which of the following is true for excretion in humans?
- a) Glucose and amino acids are reabsorbed in PCT by simple diffusion.
b) DCT is impermeable to water

- c) On an average , 25-30 gm of urea is excreted out per day
 d) Maximum reabsorption occurs in the loop of Henle
- 111) **Assertion :** Auditory ossicles are small bones present in the cavity of inner ear.
Reason : Auditory ossicles maintain the balance of air pressure between two sides of ear drum.
 a) Both assertion and reason are true and reason is correct explanation of assertion
 b) Both assertion and reason are true but reason is not correct explanation of assertion
 c) Assertion is true reason is false
 d) Both Assertion and reason are false
- 112) The age of fossils or dating of fossils can be best estimated by
 a) radioactive carbon (C^{14}) dating method
 b) radioactive nitrogen method
 c) radioactive clock method
 d) None of the above
- 113) Mosses and ferns are found in moist and shady places because both
 a) require presence of water for fertilization
 b) do not need sunlight for photosynthesis
 c) depend on microorganisms in water for their nutrition
 d) cannot compete with sun loving plants
- 114) Phytohormones are
 a) hormones regulating growth from seed to adulthood
 b) growth regulators synthesized by plants and influencing physiological process
 c) hormones regulating flowering
 d) hormones regulating secondary growth
- 115) Which of the following pairs of plants structures has haploid number of chromosomes?
 a) nucellus and antipodal cells
 b) egg nucleus and secondary nucleus
 c) megaspore mother cell and antipodal cells
 d) egg cell and antipodal cells
116. In a flower, there are five unequal petals. The posterior petal is the largest. The two anterior petals are partially fused to form a boat-shaped structure. The two lateral petals are smaller than the posterior petal. Which one of the following characters is not associated with such a flower?
 a) The aestivation of the petals is descendingly imbricate
 b) The odd sepal is anterior
 c) The pollination is by piston mechanism
 d) The number of carpels is more
- 117) In pea, castor and maize the number of cotyledons are
 a) 2, 2 and 1 respectively
 b) 1, 2 and 2 respectively
 c) 2, 1 and 2 respectively
 d) 1, 2 and 1 respectively
- 118) Weberian ossicles are found in
 a) frog
 b) snakes
 c) fishes
 d) birds
- 119) Pseudostratified epithelium lines
 a) urethra and oviduct
 b) trachea and respiratory tract
 c) urinary bladder
 d) endothelium
- 120) The camel's hump is composed of a tissue, which provides water when oxidised is, called
 a) areolar
 b) skeletal
 c) adipose
 d) muscular
- 121) A human RBC is placed in 1.5% salt solution. It will
 a) swell up
 b) shrink
 c) remain unaffected
 d) burst
- 122) In a spadix inflorescence the spathe encloses

- a) umbel b) biparous cyme
c) catkin d) spike
- 123) In a dicotyledonous stem, what is the sequence of tissues from the outside to the inside?
a) phellem- pericycle – endodermis- phloem
b) phellem-phloem-endodermis-pericycle
c) phellem-endodermis-pericycle-phloem
d) pericycle-phellem-endodermis-phloem
- 124) In CAM plants, CO₂ acceptor is
a) RuBP b) PEP
c) OAA d) PGA
- 125) Number of chromosomes in root cells of an angiospermic plant is 14, than the number of chromosomes in its synergid cells will be
a) 14 b) 7
c) 28 d) 21
- 126) Name the syndrome which is caused when there is trisomy of the sex chromosomes.
a) turner's syndrome
b) Down's syndrome
c) klinefelter's syndrome
d) Patau's syndrome
127. The 'gene-flow' terms refer to
a) exchange of genes over a chromosome
b) inversion of genes over a chromosome
c) passing on the genes from one generation to the other
d) genetic result of intergroup mating.
- 128) In assisted reproductive technology where gametes have been fertilized in vitro, which of the following is practicable for embryo transplantation in fallopian tube?
a) only embryo up to 8 blastomeres if zygote is not transplanted.
b) only zygote is transplanted not embryo
c) either embryo or zygote with 8 blastomere phase transplanted.
d) morulla with 8-24 celled stage is transplanted in fallopian tube
129. **Assertion** : in a regular medical examination of a small population , a 35 year old lady was found to have higher levels of oestrogens, progesterone in her blood.
Reason : The lady is 12 weeks pregnant.
a) Both assertion and reason are true and reason is correct explanation of assertion
b) Both assertion and reason are true but reason is not correct explanation of assertion
c) Assertion is true reason is false
d) Both Assertion and reason are false
130. The first heart sound is produced when
a) diastole begins
b) semilunar valve close quickly
c) interventricular pressure decreases
d) bicuspid and tricuspid valve close quickly
- 131) The low pressure below the arterial PO₂ results in
a) release of CO_{2v} from the cell
b) formation of haemoglobin
c) production of bicarbonate
d) reduction of blood volume
- 132) Intercellular communication in multicellular organism occurs through
a) digestive system only
b) respiratory system only
c) nervous system only
d) both nervous and endocrine system
- 133) Which is not a reflex action?
a) Salivation
b) Eye opening and closing
c) Response to pinching pin in a frog leg
d) Sweating
- 134) Heartwood differs from sapwood in
a) presence of rays and fibres
b) absence of vessels and parenchyma
c) having dead and non-conducting elements
d) being susceptible to pests and pathogens.

- 135) **Assertion** : Deforestation is one main factor to contributing to global warming
Reason : Besides CO₂, two other gases methane and CFCs are also included under green house gases
- Both Assertion and Reason are true and Reason is the correct explanation of Assertion
 - Both Assertion and Reason are true but Reason is not the correct explanation of Assertion
 - Assertion is true but Reason is false
 - Both Assertion and Reason are false
- 136) Kyoto protocol is related with
- ozone layer depletion
 - green house effect
 - water pollution
 - conservation of wildlife
- 137) Which plant species is on the verge of extinction due to over-exploitation ?
- gloriosa
 - podophyllum
 - ceritella
 - all of these
- 138) The most important source of energy on earth is
- ATP molecules
 - chlorophyll
 - xanthophyll
 - carotenoids
- 139) **Assertion** : In food chain members of successive higher levels are fewer in number.
Reason : Number of organisms at any trophic level depends upon the availability of organisms, which serve as food at the lower level.
- Both Assertion and Reason are true and Reason is the correct explanation of Assertion
 - Both Assertion and Reason are true but Reason is not the correct explanation of Assertion
 - Assertion is true but Reason is false
 - Both Assertion and Reason are false
- 140) Which of the following helps in the growth of terrestrial pteridophytes in tropical rain forest?
- Microclimate
 - C₄-pathway
 - Eutrophication
 - Biological magnification
- 141) Enamel of tooth is secreted by
- dentoblasts
 - dentocytes
 - odontoblasts
 - odontocytes
- 142) Which of the following is not a neurotransmitter?
- norepinephrine
 - acetylcholine
 - gamma aminobutyric acid
 - ADH
- 143) **Assertion** : Interferons are a type of antibodies produced by body cells infected by bacteria
Reason : Interferons stimulate inflammation at the site of injury
- Both Assertion and Reason are true and Reason is the correct explanation of Assertion
 - Both Assertion and Reason are true but Reason is not the correct explanation of Assertion
 - Assertion is true but Reason is false
 - Both assertion and Reason are false
- 144) Removal of anthers of some flowers during plant breeding is
- emasculation
 - anthesis
 - pollination
 - for collection of pollen
- 145) Triticum aestivum, the common bread wheat is
- triploid with 21 chromosomes
 - hexaploid with 42 chromosomes
 - tetraploid with 30 chromosomes
 - diploid with 14 chromosomes
- 146) An example of gene therapy is

- a) production of injectable hepatitis-B vaccine
 b) production of vaccines in food crops like potatoes which can be eaten
 c) introduction of gene for adenosine deaminase in persons suffering from Severe Combined Immuno Deficiency (SCID)
 d) production of test tube babies by artificial insemination and implantation of fertilized eggs
- 147) Which of the following method is used for detection of antibodies?
 a) Competitive ELISA
 b) Indirect or sandwich ELISA
 c) antibody class captive ELISA
 d) All of the above
- 148) **Assertion :** vegetable oils are fats which are present in plant cells in soluble form
Reason : vegetable oils occur only in cells of embryo
- a) Both assertion and reason are true and reason is correct explanation of assertion
 b) Both assertion and reason are true but reason is not correct explanation of assertion
 c) Assertion is true reason is false
 d) Both Assertion and reason are false
- 149) Select the option having all correctly matched pairs.
- | | |
|--------------|-----------------------------|
| A. alkaloids | (i) carotenoid; anthocyanin |
| B. pigments | (ii) vinblastin; curcumin |
| C. drugs | (iii) morphine; codeine |
- a) A-i, B-ii, C-iii b) A-ii, B-iii, C-i
 c) A-iii, B-i, C-ii d) A-i, B-iii, C-ii
- 150) The plant material, which is widely used in the preparation of culture medium, is
 a) cycas revoluta b) cocos nucifera
 c) pinus longifolia d) borassus flabellifer

Directions (Question 151-155) : In each of the following questions, out of the given alternatives, choose the one which best expresses the meaning of the given word.

- 151) DOGMA
 a) Possibility b) Feeling
 c) Tenet d) Doubt
- 152) DILIGENT
 a) Industries b) Intelligent
 c) Modest d) Energetic
- 153) SYCOPHANT
 a) Suppliant b) Follower
 c) Flatterer d) Admirer
- 154) BESIEGED
 a) Encircled b) Skirted
 c) Troubled d) Destroyed
- 155) ABROGATION
 a) Abridgement b) Deprivation
 c) Annulation d) Dismissal

Directions (Question 156-160) : Select the word or phrase that is most nearly opposite in meaning to the word or phrase in capital letter given below

- 156) CRAVEN
 a) Direct b) Desirous
 c) Bold d) Controlled
- 157) ALACRITY
 a) Courtesy b) Slowness
 c) Plenty d) Despair
- 158) BLAND
 a) Caustic b) Meagre
 c) Uncooked d) Helpless
- 159) JADED
 a) Upright b) Stimulated
 c) Void d) Aspiring
- 160) SPUNK
 a) Success b) Lack of intelligence
 c) Timidity d) Loss of prestige

Directions (Question 161-165) : In each of the following questions, choose the alternative which

best expresses the meaning of the idiom.

- 161) To turn the cover
 a) To take a new way of life
 b) To work hard
 c) To pass the crises
 d) To hide the reality
- 162) To hit the nail on the head
 a) To hit the target
 b) To catch someone napping
 c) To guess right
 d) To settle the old score
- 163) To run amuck
 a) To run a race
 b) To run about in frenzy
 c) To feel exhausted
 d) To run to somebody's help
- 164) A bull in a china shop
 a) A person who is very ugly but loves the beautiful things of life
 b) A person who takes a sadistic delight in harming innocent people
 c) A person who becomes too excited where no excitement is warranted
 d) A person who is rough and clumsy where skill and care are required
- 165) By fair means or foul
 a) Without using common sense
 b) Without difficulty
 c) In any way, honest or dishonest
 d) Having been instigated

Directions (Question 166-170) : In the following items some parts of the sentence have been jumbled up. You are required to rearrange these parts which are labelled P, Q, R and S to produce the correct sentence. Choose the proper sequence and mark in your answer sheet accordingly.

- 166) Even
 P) the underbelly of the city's crumbling health infrastructure too

- Q)attacks that also reveal
 R)as the city's urban infrastructure crumbles
 S)it is these increasing cases of canine
 The proper sequence should be
 a) QPRS b) RSQP
 c) QSRP d) RPQS
- 167) Perhaps
 P)that globalization has endorsed is that identities of
 Q)the most pernicious myth
 R)infinitely assimilable, flexible or fractured
 S)people, societies and nations are
 The proper sequence should be
 a) QPSR b) RPSQ
 c) RSPQ d) QSPR
- 168) While
 P)in the years to come the salary will be adequately filled if not surpassed
 Q)tourism and hospitality sector pales slightly in comparison
 R)to other service industries like the IT and BPO sectors
 S)when it comes to pay packages, veterans of the field believe that
 The proper sequence should be
 a) QPSR b) SRQP
 c) SPQR d) QRSP
- 169) Hard
 P)where producers and consumers sell and buy in whatever market takes their fancy
 Q)through it is to get economists to agree on anything
 R)and thus an interlocking system of world trade
 S)there does seem to be a consensus to accelerate globalization
 The proper sequence should be
 a) QPRS b) RSQP
 c) QSRP d) RPQS
- 170) Since
 P)offer them a means of satisfying their own personal goals
 Q)people tend to follow those who in their view
 R)this understanding in carrying out their managerial actions, the more effective they are likely to be as leaders
 S)the more managers understand what motivates their subordinates, and the more they reflect
 The proper sequence should be
 a) QPSR b) RSPQ
 c) QSPR d) RPSQ
- Directions (Questions 171 & 172) :** There is a certain relation between two given words on one side of :: and one word is given on another side of: :: while another word is to be found from the given alternatives, having the same relation with this word as the given pair has. Select the best alternative.
- 171) Tea : Cup :: Tobacco : ?
 a) Leaves b) Hookah
 c) Toxin d) Cheroot
- 172) Mature : Regressed :: Varied
 a) Rhythmic b) Monotonous
 c) Decorous d) Obsolete
- 173) *Sword* is related to *Slaughter* in the same way as *Scalpel* is related to
 a) Murder b) Stab
 c) Surgery d) Chopping
- 174) *Sirius* is related to *Star* in the same way as *Cygnus* is related to:....
 a) Constellation b) Asteroid
 c) Galaxy d) Meteor
- Directions (Questions 175-177) :** The following questions consist of two words each that have a certain relationship to each other followed by four lettered pairs of words. Select the lettered pair that has the same relationship

as the original pair of words.

- 175) Evaporation : Cloud
 a) Mountain : Snow
 b) Pressure : Atmosphere
 c) Book : Pages
 d) Tension : Breakdown
- 176) Optimistic : Pessimistic
 a) Difficult : Impossible
 b) Study : Play
 c) Tolerating : Disgusting
 d) Export : Import
- 177) Protagonist : Character
 a) Earth : Moon b) Termite : Insect
 c) Lizard : Housefly d) Whale : Fish

Directions (Questions 178 & 179) : In each of the following questions, there is a certain relation between two given numbers on one side of : and one number is given on another side of :: while another number is to be found from the given alternatives, having the same relation with this number as the numbers of the given pair bear. Choose the best alternative.

- 178) Given set: (246, 257, 358)
 a) (145, 235, 325) b) (143, 253, 246)
 c) (273, 365, 367) d) (233, 343, 345)
- 179) Given set: (63, 49, 35)
 a) (72, 40, 24) b) (72, 48, 24)
 c) (64, 40, 28) d) (81, 63, 45)

Directions (Questions 180 & 181) : In each of the following questions, there is some relationship between the two terms to the left of :: and the same relationship holds between the two terms to its right. Also, in each question, one term either to the right of :: or to the left of it is missing. This term is given as one of the alternatives given below each question. Find out this term.

- 180) ACFJ is related to ZXUQ in the same way as EGJN is related to ?.
 a) DBYU b) VTQM
 c) VTRP d) VUSQ

181) EGIK is related to WUSQ in the same way as DFHJ is related to ?.

- a) BDFH b) ECGI
 c) SQOM d) XVTR

Direction (Questions 182 & 183) : In each of the following questions, four words have been given, out of which three are alike in some manner and the fourth one is different. Choose out the odd one.

182. Choose the odd one

- a) Mermaid b) Sphinx
 c) Unicorn d) Dinosaur

183) Choose the odd one

- a) Beaches b) Lagoons
 c) Bars d) Moraines

Directions (Questions 184 & 185) : In each of the following questions, a number series is given with one term missing. Choose the correct alternative that will continue the same pattern and fill in the blank spaces.

184) 0, 2, 8, 14, (), 34

- a) 24 b) 22
 c) 20 d) 18

185) 19, 2, 38, 3, 114, 4, ()

- a) 228 b) 256
 c) 352 d) 456

186) "saraswati samman" is an award given for excellence in the field of

- a) sports b) social service
 c) literature d) nuclear power

187) 'Heavy water' is used in which of the following fields?

- a) Thermal power b) cement
 c) iron & steel d) nuclear power

188) The world 'No Tobacco Day' is observed on which of the following days?

- a) 13th may b) 31st may
 c) 18th June d) 30th June

189) What is cross border exchange?

- a) trading of foreign currency in India

- b) trading of Indian rupee in exchange of other currencies/goods
 c) Hawala transactions in Indian rupee
 d) Unauthorized remittance of Indian rupee
- 190) Which of the following is billionth of a second?
 a) Gigabyte b) terabyte
 c) nanosecond d) microsecond
- 191) The strait which connect the Arabian sea and bay of Bengal is known as
 a) Bering b) hormuz
 c) palk d) Malacca
- 192) The place where the blue Nile and white Nile meet is
 a) Port said b) Cairo
 c) Khartoum d) Alexandria
- 193) Which of the following countries was admitted the 189th member of the United Nations in September 2000?
 a) Nauru b) Palau
 c) Tonga d) Tuvalu
- 194) Which of the following are the forms of precipitation?
 1. dew 2. Fog
 3. Hail 4. Snow
 Select the correct answer using the code given below :
 a) 1 and 2 b) 3 and 4
 c) 1 and 3 d) 2 and 4
- 195) Most of the ozone in the atmosphere is found in
 a) ionosphere b) mesosphere
 c) stratosphere d) troposphere
- 196) The foreign traveller who visited India during the Vijayanagar period was
 a) Megasthenes b) Yuan Chawng
 c) Fa-hien d) Nicolo Conti
- 197) Who among the following was the political guru of 'Mahatma Gandhi'?
 a) Bal Gangadhar Tilak
 b) Gopal Krishna Gokhale
 c) Dadabhai Naoroji
 d) Surendra Nath Banerjee
- 198) Which one of the following rulers built the 'Bibi Ka Maqbara'?
 a) Akbar b) Jahangir
 c) Shahjahan d) Aurangzeb
- 199) The word "Satyameva Jayate" in the State Emblem adopted by the Government of India has been taken from which Upanishad?
 a) Aitareya Upanishad
 b) Mundaka Upanishad
 c) Adhyatma Upanishad
 d) Prasna Upanishad
- 200) In India, the judges of the High Court of a state are appointed by
 a) The President
 b) The Vice-President
 c) The Chief Justice of India
 d) The Governor
