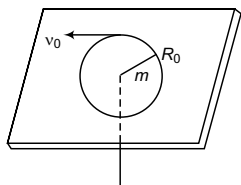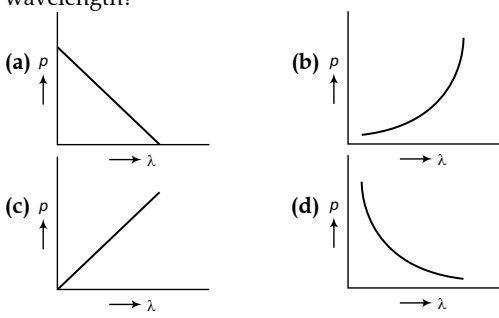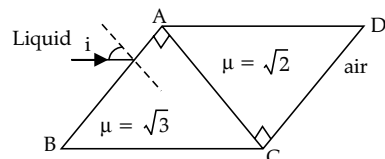# MOCK TEST PAPER | 2

*General Instructions:* **Same as Mock Test Paper 1**

## PHYSICS

### Section A

1. The ratio of the dimension of Planck's constant and that of the moment of inertia is the dimension of
   (a) time.
   (b) frequency.
   (c) angular momentum.
   (d) velocity.

2. In an unbiased p-n junction, holes diffuse from the p-region to n-region because:
   (a) free electrons in the n-region attract them.
   (b) they move across the junction by the potential difference.
   (c) hole concentration in p-region is more as compared to n-region.
   (d) All of the above.

3. An N-P-N transistor conducts when:
   (a) both collector and emitter are negative with respect to the base.
   (b) both collector and emitter are positive with respect to the base.
   (c) collector is positive and emitter is negative with respect to the base.
   (d) collector is positive and emitter is at same potential as the base.

4. A block of mass 50 kg slides over a horizontal distance of 1 m. If the coefficient of friction between their surfaces is 0.2, then work done against friction is:
   (a) 98 J
   (b) 72 J
   (c) 56 J
   (d) 34 J

5. If $n_1$, $n_2$ and $n_3$ are the fundamental frequencies of three segments into which a string is divided, then the original fundamental frequency $n$ of the string is given by:
   (a) $\dfrac{1}{n} = \dfrac{1}{n_1} + \dfrac{1}{n_2} + \dfrac{1}{n_3}$
   (b) $\dfrac{1}{\sqrt{n_1}} + \dfrac{1}{\sqrt{n_2}} + \dfrac{1}{\sqrt{n_3}}$
   (c) $\sqrt{n} = \sqrt{n_1} + \sqrt{n_2} + \sqrt{n_3}$
   (d) $n = n_1 + n_2 + n_3$

6. In Young's double slit experiment, the slits are 2 mm apart and are illuminated by photons of two wavelengths $\lambda_1$ = 12000 Å and $\lambda_2$ = 10000 Å. At what minimum distance from the common central bright fringe on the screen, 2 m from the slit will a bright fringe from one interference pattern coincide with a bright fringe from the other ?
   (a) 3 mm
   (b) 8 mm
   (c) 6 mm
   (d) 4 mm

7. A mass $m$ moves in a circle on a smooth horizontal plane with velocity $v_0$ at a radius $R_0$. The mass is attached to a string which passes through a smooth hole in the plane as shown. The tension in the string is increased gradually and finally $m$ moves in a circle of radius $R_0/2$. The final value of the kinetic energy is:



(a) $2mv_0^2$
(b) $\dfrac{1}{2} mv_0^2$
(c) $mv_0^2$
(d) $\dfrac{1}{4} mv_0^2$

8. The displacement of a particle varies with time according to the relation $y = a \sin \omega t + b \cos \omega t$
   (a) The motion is oscillatory but not SHM
   (b) The motion is SHM with amplitude a + b
   (c) The motion is SHM with amplitude $a^2 + b^2$
   (d) The motion is SHM with amplitude $\sqrt{a^2 + b^2}$

9. A beam of light of $\lambda$ = 600 nm from a distant source falls on a single slit 1 mm wide and the resulting diffraction pattern is observed on a screen 2 m away. The distance between first dark fringes on either side of the central bright fringe is:
   (a) 1.2 cm
   (b) 1.2 mm
   (c) 2.4 cm
   (d) 2.4 mm

10. An ideal diatomic gas occupies a volume $V_1$ at a pressure $P_1$. The gas undergoes a process in which the pressure is proportional to the volume. At the end of process the rms speed of the gas molecules has doubled from its initial value then the heat supplied to the gas in the given process is:
    (a) $7\,P_1V_1$
    (b) $8\,P_1V_1$
    (c) $9\,P_1V_1$
    (d) $10\,P_1V_1$

11. Moment of inertia of a uniform circular disc about a diameter is I. Its moment of inertia about an axis perpendicular to its plane and passing through a point on its rim will be:
    (a) 5I
    (b) 3I
    (c) 6I
    (d) 4I

12. The distance travelled by a particle starting from rest and moving with an acceleration $\dfrac{4}{3}$ m/s$^2$ in the third second is:
    (a) 6 m
    (b) 4 m
    (c) $\dfrac{10}{3}$ m
    (d) $\dfrac{19}{3}$ m

13. The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system?
    (a) 20 Hz
    (b) 30 Hz
    (c) 40 Hz
    (d) 10 Hz

14. The de Broglie wavelength of a neutron of mass $m$ in thermal equilibrium with heavy water at a temperature T (Kelvin) is:
    (a) $\dfrac{h}{\sqrt{3mk\mathrm{T}}}$
    (b) $\dfrac{2h}{\sqrt{3mk\mathrm{T}}}$
    (c) $\dfrac{2h}{\sqrt{mk\mathrm{T}}}$
    (d) $\dfrac{h}{\sqrt{mk\mathrm{T}}}$

15. An electric dipole is placed at an angle of 30° with an electric field of intensity 2.0 × 10$^5$ N/C. It experiences a torque equal to 4 Nm. The charge on the dipole, if the dipole length is 2 cm, is:
    (a) 8 mC
    (b) 2 mC
    (c) 5 mC
    (d) 7 mC

16. Three liquids of densities $\rho_1$, $\rho_2$ and $\rho_3$ (with $\rho_1 > \rho_2 > \rho_3$) having the same value of surface tension T, rise to the same height in three identical capillaries. The angles of contact $\theta_1$, $\theta_2$ and $\theta_3$ obey:
    (a) $\pi/2 > \theta_1 > \theta_2 > \theta_3 \geq 0$
    (b) $0 \leq \theta_1 < \theta_2 < \theta_3 < \pi/2$
    (c) $\theta_1 = \theta_2 = \theta_3 = \pi$
    (d) $\pi > \theta_1 > \theta_2 > \theta_3 > \pi/2$

**17.** A particle moves for 20 seconds with velocity 3 m/s and then with velocity 4 m/s for another 20 seconds and finally moves with velocity 5 m/s for next 20 seconds. What is the average velocity of the particle:
(a) 3 m/s    (b) 4 m/s    (c) 5 m/s    (d) Zero

**18.** A mass $m$ is suspended from a string of length $l$ and force constant $k$. The frequency of vibration of the mass is $f_1$. The spring is cut into two equal parts and the same mass is suspended from one of the parts. The new frequency of vibration of mass is $f_2$. Which of the following relation between the frequencies is correct.
(a) $f_1 = \sqrt{2} f_2$        (b) $f_1 = f_2$
(c) $f_1 = 2f_2$         (d) $f_2 = \sqrt{2} f_1$

**19.** Light travels through a glass plate of thickness $t$ and having refractive index $n$. If $c$ is the velocity of light in vacuum, the time taken by the light to travel this thickness of glass is:
(a) $t/nc$    (b) $tnc$    (c) $nt/c$    (d) $tc/n$

**20.** Which of the following figures represent the variation of particle momentum and the associated de Broglie wavelength?



**21.** The potential gradient along the length of a uniform wire is 10 V/m. B and C are the two points at 30 cm and 60 cm on a meter scale fitted along the wire. The potential difference between B and C will be:
(a) 3 V    (b) 0.4 V    (c) 7 V    (d) 4 V

**22.** Magnetic field intensity at the centre of a coil of 50 turns, radius 0.5 m and carrying a current of 2 A is:
(a) $0.5 \times 10^{-5}$ T      (b) $1.26 \times 10^{-4}$ T
(c) $3 \times 10^{-5}$ T       (d) $4 \times 10^{-5}$ T

**23.** The e.m.f E = 4 cos 1000$t$ volts is applied to an LR circuit containing inductance 3 mH and resistance 4 $\Omega$ connected in series. The amplitude of current is:
(a) $4\sqrt{7}$ A    (b) 1.0 A    (c) $\dfrac{4}{7}$ A    (d) 0.8 A

**24.** The displacement of a particle as a function of time $t$ is given by the expression $S = t^3 - 6t^2 + 3t + 4$, where S is in metre and $t$ in second. Then the magnitude of the velocity of the particle, when its acceleration is zero is:
(a) 4 ms$^{-1}$    (b) 5 ms$^{-1}$    (c) 3 ms$^{-1}$    (d) 9 ms$^{-1}$

**25.** A particle of mass $m$ is moving with a uniform velocity $v_1$. It is given an impulse such that its velocity becomes $v_2$. The impulse is equal to:
(a) $m[|v_2| - |v_1|]$        (b) $\dfrac{1}{2}\left[v_2^2 - v_1^2\right]$
(c) $m[v_2 + v_1]$         (d) $m[v_2 - v_1]$

**26.** The wavelength of light diminishes $\mu$ times ($\mu$=1.33 for water) in a medium. From inside water a diver looks at an object whose natural colour is green. He sees the object as:
(a) Green    (b) Blue    (c) Yellow    (d) Red

**27.** A gas is compressed at a constant pressure of 50 Nm$^{-2}$ from a volume of 10 m$^3$ to a volume of 4 m$^3$. Energy of 100 J is then added to the gas by heating. Its internal energy is:
(a) increased by 400 J      (b) increased by 200 J
(c) increased by 100 J      (d) decreased by 200 J

**28.** A ball of mass m approaches a wall of mass M (>> m) with speed 4 m/s along the normal to the wall. The speed of wall is 1 m/s towards the ball. The speed of the ball after an elastic collision with the wall is:
(a) 5 m/s away from the wall (b) 9 m/s away from the wall
(c) 3 m/s away from the wall (d) 6 m/s away from the wall

**29.** What is the effect of increasing the intensity of the light that falls on the emitter in a photoelectric effect apparatus?
(a) Cut-off frequency decreases
(b) Stopping potential decreases
(c) Time delay for emission of photoelectron decreases
(d) Saturation photocurrent increases

**30.** This question has Statement I and Statement II. Of the four choices given after the statement, choose the one that best describes the two statements.
**Statement I:** Specific heat capacity is the cause of formation of land and sea breeze.
**Statement II:** The specific heat of water is more than land.
(a) Statement I is true; Statement II is true and Statement II is the correct explanation of Statement I.
(b) Statement I is true, Statement II is true, but Statement II is not the correct explanation of Statement I.
(c) Statement I is true; Statement II is false.
(d) Statement I is false; Statement II is true.

**31.** A ray of light from a liquid ($\mu = \sqrt{3}$) is incident on a system of two right angled prisms of refractive indices $\sqrt{3}$ and $\sqrt{2}$ as shown. The ray suffers zero deviation when emerges into air from CD. The angle of incidence $i$ is:



(a) 45°    (b) 35°    (c) 20°    (d) 10°

**32.** This question has Statement I and Statement II. Of the four choices given after the statement, choose the one that best describes the two statements.
**Statement I**: When a machine-gun fires n bullets per second with kinetic energy K, then the power of the machine-gun is $p = nK$.
**Statement II**: Power is the rate at which work is done.
(a) Statement I is true, Statement II is true and Statement II is the correct explanation of Statement I
(b) Statement I is true, Statement II is true, but Statement II is not the correct explanation of Statement I
(c) Statement I is true, Statement II is false
(d) Statement I is false, Statement II is true

**33.** When unpolarized light beam is incident from air onto glass ($n$ = 1.5) at polarising angle:
(a) Reflected light is polarized 100 percent
(b) Reflected & refracted beams are partially polarized
(c) Reflected & refracted beams are completely polarized
(d) Refracted light is polarized 100 percent

**34.** If a small amount of antimony is added to germanium crystal:

(a) it becomes a *p*-type semiconductor

(b) the antimony become an acceptor atom

(c) there will be more free electrons than holes in the semiconductor

(d) its resistance is increased

**35.** A piece of copper and silicon are cooled from $T_1$ to $T_2$. The resistance of

(a) Copper increases and silicon decreases

(b) Copper decreases and silicon increases

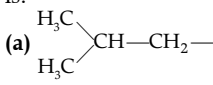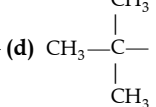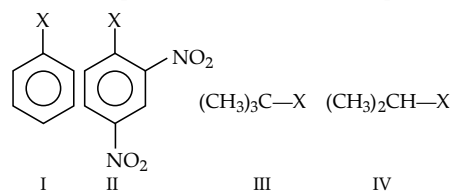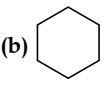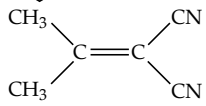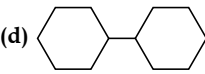(c) Both will increase

(d) Both will decrease

## Section B

**36.** When a long spring is stretched by 2 cm, its potential energy is U. If the spring is stretched by 10 cm, the potential energy stored in it will be:

(a) 25 U (b) U/5

(c) 5 U (d) 10 U

**37.** The electric and the magnetic field, associated with an e.m. wave, propagating along the +z-axis, can be represented by:

(a) $E = E_o\hat{i}, B = B_o\hat{j}$ (b) $E = E_o\hat{k}, B = B_o\hat{i}$

(c) $E = E_o\hat{j}, B = B_o\hat{i}$ (d) $E = E_o\hat{j}, B = B_o\hat{k}$

**38.** A railway engine of mass $10^6$ kg, moving towards north at 10 m/s collides elastically with a trolley of mass 50 kg at rest on the straight horizontal track. After collision

(a) the engine moves with a speed less than 10 m/s towards north

(b) the trolley moves towards the North at a speed of 10 m/s

(c) the trolley gets locked to the engine

(d) the trolley moves towards the North at a speed of 20 m/s

**39.** The radii of circular orbits of two satellites A and B of Earth, are 4R and R, respectively. If the speed of satellite A is 3V, then the speed of satellite B will be:

(a) 3V/4 (b) 6V (c) 12V (d) 3V/2

**40.** The resistance of a wire is 'R' ohm. If it is melted and stretched to 'n' times its original length, its new resistance will be:

(a) R/n (b) $n^2R$ (c) $R/n^2$ (d) nR

**41.** At what angle ($\theta$) with the horizontal should a body be projected so that its horizontal range equals the maximum height it attains?

(a) $\theta = \tan^{-1}(1)$ (b) $\theta = \tan^{-1}(2)$

(c) $\theta = \tan^{-1}(3)$ (d) $\theta = \tan^{-1}(4)$

**42.** A steel wire of cross sectional area $3 \times 10^{-6}$ m$^2$ can withstand a maximum strain of $10^{-3}$. Youngs modulus of steel is $2 \times 10^{11}$ N/m$^2$. The maximum mass the wire can hold is ($g = 10$ m/s$^2$

(a) 40 kg (b) 60 kg (c) 80 kg (d) 100 kg

**43.** Two spherical soap bubbles formed in vaccum have radius of 3.0 mm and 4.0 mm. They coalesce to form a single spherical bubble. If the temperature remains unchanged then the radius of new bubble formed is?

(a) 5.0 mm (b) 7.0 mm (c) 6.0 mm (d) 12.0 mm

**44.** At what temperature would the root mean square speed of a gas molecule have twice its value at 100°C ?

(a) 200°C (b) 473°C (c) 927°C (d) 1219°C

**45.** The amplitude of the electric field of a plane EM wave in air is $9.0 \times 10^{-4}$ Vm$^{-1}$. The amplitude of the magnetic field will be

(a) $2 \times 10^{-8}$ T (b) $2 \times 10^{-10}$ T

(c) $3 \times 10^{-12}$ T (d) $3 \times 10^4$ T

**46.** The relative permeability of a substance X is slightly greater than unity while that of substance Y is slightly less than unity.

(a) X is ferromagnetic and Y is paramagnetic

(b) X is diamagnetic and Y is paramagnetic

(c) X is paramagnetic and Y is diamagnetic

(d) X is ferromagnetic and Y is diamagnetic

**47.** A cylindrical tube open at both ends has a fundamental frequency $n$. If it is half immersed in water its fundamental frequency becomes

(a) $\dfrac{n}{2}$ (b) $2n$ (c) $\dfrac{n}{4}$ (d) $n$

**48.** Three capacitors connected in series have an effective capacitance of 6 µF. If one of the capacitors is removed the effective capacitance is 10 µF. The capacitance of the capacitor that is removed is

(a) 5 µF (b) 10 µF (c) 15 µF (d) 20 µF

**49.** The orbital speed of the electron in the ground state of hydrogen atom is $v$. What will be its orbital speed when it absorbs a photon of energy 10.2 eV?

(a) $3v$ (b) $\dfrac{v}{3}$ (c) $2v$ (d) $\dfrac{v}{2}$

**50.** The primary of a transformer has 400 turns, while the secondary has 2000 turns. If the power output from the secondary at 1000 V is 12 kW, what is primary voltage?

(a) 600 V (b) 200 V (c) 800 V (d) 900 V
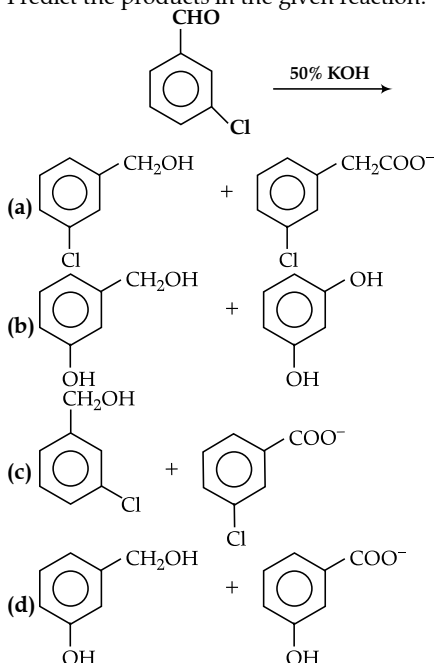
# CHEMISTRY

## Section A

**51.** When 22.4 L of $H_2$ (g) is mixed with 11.2 L of $Cl_2$(g), each at STP, the moles of HCl(g) formed is equal to:

(a) 1 mole of HCl(**g**) (b) 2 moles of HCl(**g**)

(c) 0.5 mole of HCl(**g**) (d) 1.5 moles of HCl(**g**)

**52.** Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric field?

(a) Na (b) K (c) Rb (d) Li

**53.** Which of the following statements is not true for halogens?

(a) All halogens show positive oxidation states.

(b) All are oxidizing agents.

(c) All form monobasic oxyacids.

(d) Chlorine has the highest electron-gain enthalpy.

**54.** How many electrons can fit in the orbital for which $n = 3$ and $l = 1$ ?

(a) 2 (b) 6 (c) 10 (d) 14

**55.** Hydrocarbon (A) reacts with bromine by substitution to form an alkyl bromide which by Wurtz reaction is converted to gaseous hydrocarbon containing less than four carbon atoms. (A) is:
(a) $CH_3$–$CH_3$  (b) $CH_2$=$CH_2$ (c) $CH\equiv CH$  (d) $CH_4$

**56.** Which of the following pairs of compounds is isoelectronic and isostructural?
(a) $BeCl_2$, $XeF_2$      (b) $TeI_2$, $XeF_2$
(c) $IBr_2^-$, $XeF_2$      (d) $IF_3$, $XeF_2$

**57.** Hot concentrated, sulphuric acid is a moderately strong oxidizing agent. Which of the following reactions do not show oxidizing behaviour?
(a) $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$
(b) $S + 2H_2SO_4 \rightarrow 3SO_2 + 2H_2O$
(c) $C + 2H_2SO_4 \rightarrow CO_2 + 2SO_2 + 2H_2O$
(d) $CaF_2 + H_2SO_4 \rightarrow CaSO_4 + 2HF$

**58.** The radical —$\dot{C}H_2$ is aromatic because it has:

(a) 6p orbitals and 6 unpaired electrons.
(b) 7p orbitals and 6 unpaired electrons.
(c) 7p orbitals and 7 unpaired electrons.
(d) 6p orbitals and 7 unpaired electrons.

**59.** Oxidation number of Xe in $XeOF_2$ ion is
(a) Zero     (b) +2     (c) +4     (d) +3

**60.** The solubility of AgCl(s) with solubility product $1.6 \times 10^{-10}$ in 0.1 M NaCl solution would be:
(a) $1.26 \times 10^{-5}$ M     (b) $1.6 \times 10^{-9}$ M
(c) $1.6 \times 10^{-11}$ M     (d) Zero

**61.** The structure of isobutyl group in an organic compound is:
(a) 
(b) $CH_3$—$CH_2$—$CH_2$—$CH_3$ (with $CH_3$ below)
(c) $CH_3$—$CH_2$—$CH_2$—$CH_2$—  (d) $CH_3$—$\overset{CH_3}{\underset{CH_3}{C}}$—

**62.** In a zero order reaction for every 10°C rise of temperature, the rate is doubled. If the temperature is increased from 10°C to 100°C, the rate of the reaction will become:
(a) 256 times (b) 512 times (c) 64 times (d) 128 times

**63.** Consider the nitration of benzene using mixed conc. $H_2SO_4$ and $HNO_3$. If a large amount of $KHSO_4$ is added to the mixture, the rate of nitration will be:
(a) Unchanged     (b) Doubled
(c) Faster     (d) Slower

**64.** The basic structural unit of silicates:
(a) $SiO^-$   (b) $SiO_4^{4-}$   (c) $SiO_3^{2-}$   (d) $SiO_4^{2-}$

**65.** When initial concentration of a reaction is doubled in a reaction, its half-life period is not affected. The order of the reaction is:
(a) zero     (b) second     (c) first
(d) more than zero but less than first

**66.** Total number of structural isomers of alcohols having molecular formula $C_4H_{10}O$ are...
4 and 10 are subscripts
(a) 4     (b) 3     (c) 7     (d) 2

**67.** A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 10 and by passing hydrogen gas around the platinum wire at 1 atm pressure. The oxidation potential of electrode would be:
(a) 0.059 V    (b) 0.591 V    (c) 0.118 V    (d) 1.18 V

**68.** An aqueous solution is 1.00 molal in KI. Which change will cause the vapour pressure of the solution to increase?
(a) Addition of NaCl     (b) Addition of $Na_2SO_4$
(c) Addition of 1.00 molal KI    (d) Addition of water

**69.** Cobalt (III) chloride forms several octahedral complexes with ammonia. Which of the following will not give test for chloride ions with silver nitrate at 25°C?
(a) $CoCl_3.3NH_3$     (b) $CoCl_3.4NH_3$
(c) $CoCl_3.5NH_3$     (d) $CoCl_3.6NH_3$

**70.** Reaction of a carbonyl compound with one of the following reagent involves nucleophilic addition followed by the elimination of water. The reagents is:
(a) a Grignard reagent.
(b) hydrazine in presence of feebly acidic solution.
(c) hydrocyanic acid.
(d) sodium hydrogen sulphite.

**71.** The correct order of increasing reactivity of C—X bond towards nucleophile in the following compounds is:



(a) I < II < IV < III     (b) II < III < I < IV
(c) IV < III < I < II     (d) III < II < I < IV

**72.** In which of the following molecules, all atoms are coplanar?



**73.** On polymerisation Acetaldehyde gives...
(a) Paraldehyde     (b) Meta aldehydes
(c) Trioxane     (d) Tetraoxane

**74.** Which of the following oxide is amphoteric?
(a) $SnO_2$   (b) $CaO$   (c) $SiO_2$   (d) $CO_2$

**75.** The value of ΔH for the reaction
$X_2(g) + 4Y_2(g) \rightleftharpoons 2XY_4(g)$
is less than zero. Formation of $XY_4(g)$ will be favoured at:
(a) Low pressure and low temperature.
(b) High temperature and low pressure.
(c) High pressure and low temperature.
(d) High temperature and high pressure.

**76.** 0.5 molal aqueous solution of a weak acid (HX) is 20% ionized. If $k_f$ for water is 1.86 K kg $mol^{-1}$, the lowering in freezing point of the solution is:
(a) –1.12 K     (b) 0.56 K
(c) 1.12 K     (d) –0.56 K

**77.** Given,
(i) $Cu^{2+} + 2e^- \longrightarrow Cu$, $E° = 0.337$ V
(ii) $Cu^+ \longrightarrow Cu^{2+} + 2e^-$, $E° = 0.153$ V
Electrode potential, $E°$ for the reaction,
$Cu^+ + e^- \longrightarrow Cu$, will be:
(a) 0.52 V    (b) 0.90 V    (c) 0.30 V    (d) 0.36 V

**78.** Predict the products in the given reaction:



(a) 

(b) 

(c) 

(d) 

**79.** Which one of the following orders is not in accordance with the property stated against it?
(a) $F_2 > Cl_2 > Br_2 > I_2$ (Oxidizing power)
(b) HI > HBr > HCl > HF (Acidic property in water)
(c) $F_2 > Cl_2 > Br_2 > I_2$ (Electronegativity)
(d) $F_2 > Cl_2 > Br_2 > I_2$ (Bond dissociation energy)

**80.** What is the dominant intermolecular force on bond that must be overcome in converting liquid $CH_3OH$ to gas?
(a) Hydrogen bonding
(b) Dipole-Dipole interaction
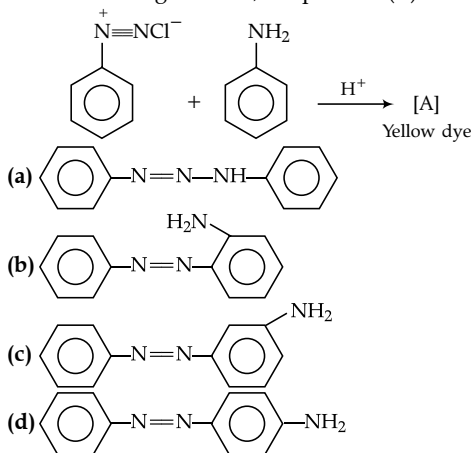(c) Covalent bonds
(d) London or dispersion forces

**81.** For the four successive transition elements (Cr, Mn, Fe and Co), the stability of +2 oxidation state will be there in which of the following order ?

[Atomic number Cr = 24, Mn = 25, Fe =26, Co = 27]
(a) Fe > Mn > Co > Cr    (b) Co > Mn > Fe > Cr
(c) Cr > Mn > Co > Fe    (d) Mn > Fe > Cr > Co

**82.** Which one of the following does not exhibit the phenomenon of mutarotation?
(a) (+) Sucrose        (b) (+) Lactose
(c) (+) Maltose        (d) (–) Fructose

**83.** In the following reaction, the product (A) is:



**84.** Which of the following complex ions is not expected to absorb visible light?
(a) $[Ni(CN)_4]^{2-}$          (b) $[Cr(NH_3)_6]^{3+}$
(c) $[Fe(H_2O)_6]^{2+}$        (d) $[Ni(H_2O)_6]^{2+}$

**85.** Among the following which is the strongest oxidizing agent?
(a) $Br_2$        (b) $I_2$        (c) $Cl_2$        (d) $F_2$

## Section B

**86.** Effective atomic number (EAN) for Mn in complex $[Mn_2(CO)_{10}]$
(a) 35        (b) 34        (c) 37        (d) 36

**87.** Which of the following statement is correct?
(a) $H_3PO_4$ does not contain reducing hydrogen
(b) White phosphorus is poisonous in nature
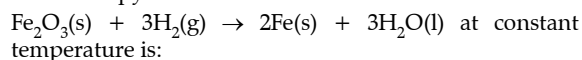(c) $SO_2$ gives reaction with NaOH similar to $CO_2$
(d) All of these

**88.** Incorrect statement regarding $PCl_3F_2$ is
(a) Axial bond is shorter than equatorial bond
(b) Molecule is non polar
(c) F placed at axial bond
(d) Molecule is polar

**89.** Which is conjugate acid of water?
(a) $H_3O^+$          (b) $OH^-$
(c) $H_2O$            (d) None of these

**90.** The enthalpy for the reaction
$Fe_2O_3(s) + 3H_2(g) \rightarrow 2Fe(s) + 3H_2O(l)$ at constant temperature is:
(a) $\Delta H = \Delta U$    (b) $\Delta H = \Delta U + RT$
(c) $\Delta H = \Delta U + 3RT$
(d) $\Delta H = \Delta U - 3RT$

**91.** Which of the following statement(s) is incorrect?
(a) When phenol vapour is passed over Zn dust, benzene is produced.
(b) The phenolic —OH group is ortho and para directing.
(c) o-nitrophenol has more boiling point than p-nitrophenol.
(d) Phenol is more acidic than o-cresol.

**92.** Which of the following statement(s) is correct?
(a) $IE_1$ of oxygen is more than that of nitrogen but $IE_2$ of N is higher than that of O.
(b) The electron gain enthalpy of N is almost zero but of P is –74.3 kJ mol⁻¹.
(c) Isoelectronic ions belong to the same period.
(d) The covalent radius of iodine is more than its Van der Waal radius.

**93.** 1g-atom of nitrogen represents
(1) 14 g nitrogen
(2) 11.4 L of $N_2$ at STP
(3) 22.4 L of $N_2$ at STP
(4) $6.023 \times 10^{23}$ molecules of $N_2$

**94.** Match **List I** with **List II**.

| List I | | List II | |
|--------|--------|---------|--------|
| (a) | $Ni(CO)_4$ | (i) | high spin complex |
| (b) | $[Co(NH_3)_6]^{3+}$ | (ii) | 1.73 BM |
| (c) | $[CoF_6]^{3-}$ | (iii) | Tetrahedral complex |
| (d) | $[Mn(CN)_6]^{4-}$ | (iv) | low spin complex |

Choose the correct answer from the options given below.
(a) (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)
(b) (a) - (iii), (b) - (iv), (c) - (i), (d) - (ii)
(c) (a) - (ii), (b) - (i), (c) - (iii), (d) - (iv)
(d) (a) - (i), (b) - (ii), (c) - (iii), (d) - (iv)

95. Given below are two statements:
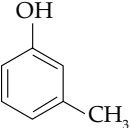    **Statement I:** Phenol is less acidic than 4-methylphenol.
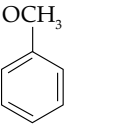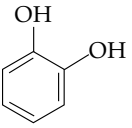    **Statement II:** The presence of an electron releasing group in phenol makes it less acidic.
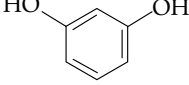    (a) Statement I is incorrect but statement II is true.
    (b) Both statement I and statement II are true.
    (c) Both statement I and statement II are false.
    (d) Statement I is correct but statement II is false.

96. The species having pyramidal shape is:
    (a) $SO_3$      (b) $BrF_3$      (c) $SiO_3^{2-}$      (d) $OSF_2$

97 Match List I with List II

| List I | | List II |
|--------|--|---------|
| (a) Catechol | (i) | OH ... $CH_3$ |
| (b) Cresol | (ii) | $OCH_3$ |
| (c) Anisole | (iii) | OH ... OH |
| (d) Resorcinol | (iv) | HO ... OH |

Choose the correct answer from the options given below:
(a) (a) - (iii), (b) - (i), (c) - (ii), (d) - (iv)
(b) (a) - (i), (b) - (ii), (c) - (iii), (d) - (iv)
(c) (a) - (ii), (b) - (iii), (c) - (iv), (d) - (i)
(d) (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)

98 Which of the following coordination complexes shows facial and meridional geometrical isomers?
(a) $[Co(NH_3)_6]$      (b) $[CoCl_2(NH_3)_4]$
(c) $[Co(NH_3)_3Cl_3]$   (d) $[CO(en)_3]^{3+}$

99 A system absorbs 10 kJ of heat at constant volume and its temperature rises from 270°C to 370°C. The value of $\Delta U$ is:
(a) 100 kJ      (b) 10 kJ      (c) 0 kJ      (d) 1 kJ

100. Calculate the entropy change for the reaction, $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ from the data given below:

| Species | $NH_3(g)$ | $N_2(g)$ | $H_2(g)$ |
|---------|-----------|----------|----------|
| S° (J/K/mol) | 192.3 | 191.5 | 130.6 |

(a) –37.65 J/K/mol      (b) –198.7 J/K/mol
(c) –31.25 J/K/mol      (d) +31.25 J/K/mol

# BOTANY

## Section A

101. Which one of the following is wrong for fungi?
    (a) They are both unicellular and multicellular.
    (b) They are eukaryotic.
    (c) All fungi possess a purely cellulosic cell wall.
    (d) They are heterotrophic.

102. In Mendel's dihybrid cross for seed shape and seed colour the $F_2$ progeny produced with genotype RrYy : rrYy : Rryy : rryy are respectively.
    (a) 4 : 2 : 2 : 1   (b) 2 : 4 : 2 : 1   (c) 2 : 2 : 4 : 1   (d) 1 : 2 : 2 : 4

103. Properties of starch useful for making it storage material are:
    (i) Easily translocated
    (ii) Chemically non-reactive
    (iii) Easily digestible
    (iv) Osmotically inactive
    (v) Synthesized during photosynthesis
    (a) (i) and (v)      (b) (ii) and (iii)
    (c) (ii) and (iv)      (d) (iii) and (v)

104. Cells of which of the following regions of root, undergo rapid enlargement and are responsible for the growth of root in length?
    (a) Maturation region      (b) Elongation region
    (c) Root cap      (d) Meristematic region

105. The chromosomes in which centromere is situated close to one end are:
    (a) Sub-metacentric      (b) Metacentric
    (c) Acrocentric      (d) Telocentric

106. Palmitic acid is a/an ___ fatty acid with ___ carbon atoms. The option that fills the blanks correctly respectively is:
    (a) Unsaturated, 16      (b) Saturated, 18
    (c) Unsaturated, 18      (d) Saturated, 16

107. What will be the amount of DNA in meiosis-II products if the meiocyte contains 40 pg DNA in G1-phase?
    (a) 20 pg      (b) 40 pg      (c) 10 pg      (d) 30 pg

108. Select the incorrect statement with respect to isobrachial chromosome.
    (a) They are metacentric chromosome.
    (b) The centromere is present at the centre.
    (c) During anaphase, these chromosome are divided into two equal arms.
    (d) They appear L-shaped during anaphase.

109. The basic and lowest category in taxonomic hierarchy is:
    (a) Kingdom   (b) Species    (c) Genus      (d) Order

110. Ploidy level of endosperm in a typical angiosperm is:
    (a) n      (b) 2n      (c) 3n      (d) 4n

111. Which of the given steps is first step of glycolysis and catalysed by hexokinase?
    (a) Glucose → Glucose - 6 - phosphate
    (b) Glucose - 6 - phosphate → Fructose - 6 - phosphate
    (c) Fructose - 6 - phosphate → Fructose - 1, 6 - bisphosphate
    (d) 2 – phosphoglycerate → phosphoenolpyruvate

112. Ethidium bromide gives _____ colour in ultraviolet radiations.
    Choose the option that fills the blank correctly.
    (a) Bright orange      (b) Purple
    (c) Green      (d) Violet

113. The causal agent of 'mad cow' disease:
    (a) Contains DNA as genetic material.
    (b) Are abnormally folded proteins.
    (c) Are larger than viruses.
    (d) Do not cause any disease in humans.

114. How many hot spots of biodiversity in India have been identified?
(a) 25     (b) 3     (c) 43     (d) 17

115. Codon which has dual function is
(a) AUG     (b) GAG     (c) UAG     (d) AGA

116. Which one of the following statements is wrong?
(a) Glycine is a sulphur containing amino acid.
(b) Sucrose is a disaccharide.
(c) Cellulose is a polysaccharide.
(d) Uracil is a pyrimidine.

117. What is wrong about mycoplasma?
(a) They are called PPLO.
(b) They are pleomorphic.
(c) They are sensitive to penicillin.
(d) They produce diseases in plants.

118. Which of the following statements is not an adaptation of the desert plants?
(a) Desert plants have a thick cuticle on their leaf surfaces.
(b) Desert plants have their stomata arranged in sunken pits.
(c) Desert plants have a special photosynthetic pathway called CAM.
(d) Desert plants have soft stems and large leaves.

119. Select the wrong statement from the following:
(a) The chloroplasts are generally much larger than mitochondria.
(b) Both chloroplasts and mitochondria contain an inner and an outer membrane.
(c) Both chloroplasts and mitochondria have an internal compartment the thylakoid space bounded by the thylakoid membrane.
(d) Both chloroplasts and mitochondria contains DNA.

120. NADP reductase enzyme is located on ___A_____ Breakdown of proton gradient leads to release of _____B____
(a) A: Stroma lamellae, B: energy
(b) A: Grana lamellae, B: electrons
(c) A: Grana lamellae, B: energy
(d) A: Stroma lamellae, B: electrons

121. Which of the following group exhibits more species diversity?
(a) Gymnosperms     (b) Algae
(c) Bryophytes     (d) Fungi

122. The proteins for DNA packaging in prokaryotes are:
(a) Histones     (b) Tubulins
(c) Actin     (d) Polyamines

123. *Bacillus thuringiensis* forms protein crystals which contain insecticidal protein. This protein:
(a) Binds with epithelial cells of midgut of the insect pest ultimately killing it.
(b) Is coded by several genes including the gene *cry*.
(c) Is activated by acid pH of the foregut of the insect pest.
(d) Does not kill the carrier bacterium, which is itself resistance to its toxin.

124. A competitive inhibitor of succinic dehydrogenase is:
(a) Oxalic acid     (b) Sulphanilamide
(c) Malonate     (d) $\alpha$-ketoglutarate

125. Many ribosomes may associate with a single *m*RNA to form multiple copies of a polypeptide simultaneously. Such strings of ribosomes are termed as:
(a) Plastidome     (b) Polyhedral bodies
(c) Polysome     (d) Nucleosome

126. Pollination in water hyacinth and water lily is brought about by the agency of:
(a) Bats     (b) Water
(c) Insects or winds     (d) Birds

127. Protonema is:
(a) Haploid and is found in mosses
(b) Diploid and is found in liverworts
(c) Diploid and is found in mosses
(d) Haploid and is found in pteridophytes

128. Given below is a sample of a portion of DNA strand giving the base sequence on the opposite strands?

5′_____GAATTC_____3′
3′_____CTTAAG_____5′

What is so special shown in it?
(a) Replication completed
(b) Deletion mutation
(c) Start codon at the 5′ end
(d) Palindromic sequence of base pairs

129. Nuclear membrane is absent:
(a) *Volvox*    (b) *Nostoc*    (c) *Penicillium* (d) *Agaricus*

130. During secondary treatment of sewage the anaerobic methanogenic bacteria in the anaerobic sludge digesters, digest the:
(a) Organic matter only
(b) Organic matter and aerobic bacteria only
(c) Inorganic matter and aerobic bacteria
(d) Organic matter, aerobic bacteria, fungi and other aerobic microbes

131. Mannitol is stored food in:
(a) *Porphyra*    (b) *Fucus*    (c) *Gracilaria*    (d) *Chara*

132. Among the situation given below, choose the one that prevents both autogamy and geitonogamy:
(a) Monoecious plants bearing unisexual flowers.
(b) Dioecious plants bearing only male or female flower.
(c) Monoecious plant with bisexual flowers.
(d) Dioecious plant with bisexual flowers.

133. The enzyme that hydrolyses phosphodiester bonds within a polynucleotide chain is:
(a) Endonuclease     (b) Exonuclease
(c) Carboxypeptidase     (d) Aminopeptidase

134. Frustule is the name of cell wall present in_____:
(a) Slime molds     (b) Cyanobacteria
(c) Dinoflagellates     (d) Diatoms

135. Conifers are adapted to tolerate extreme environmental conditions because of:
(a) Broad hardy leaves     (b) Superficial stomata
(c) Thick cuticle     (d) Presence of vessels

## Section B

136. India has deserts, rainforests, mangroves, coral reefs, wetlands, estuaries and alpine meadows. What kind of biodiversity is depicted in this statement?
(a) Geographic diversity     (b) Species diversity
(c) Ecological diversity     (d) Genetic diversity

137. During chemiosmosis in mitochondria, all protons are channelled from:
(a) inner chamber of mitochondria to outer chamber by $F_0$ part of oxysome.
(b) outer chamber of mitochondria to inner chamber by $F_0$ part of oxysome.
(c) outer chamber of mitochondria to inner chamber by complex IV.
(d) inner chamber of mitochondria to outer chamber by complex V.

138. Lenticels are involved in:
    (a) Photosynthesis   (b) Transpiration
    (c) Gaseous exchange   (d) Food transport

139. Select the incorrect statement regarding humus.
    (a) Essential for nutritional cycling.
    (b) Is light coloured amorphous substance.
    (c) Is slightly acidic, colloidal and acts as reservoir of nutrients.
    (d) Is highly resistant to microbial action.

140. A female is mentally retarded with small round head, furrowed tongue, partially open mouth and broad palm with characteristic palm crease. What will be the karyotype analysis of such an individual?
    (a) Trisomy of chromosome 21
    (b) 47 chromosomes with XXY sex chromosomes
    (c) 45 chromosomes with XO sex chromosomes
    (d) 47 chromosomes with XYY sex chromosomes

141. A couple has a child with Down syndrome (Trisomy 21). What is the most likely cause of this genetic disorder?
    (a) Autosomal recessive inheritance
    (b) Autosomal dominant inheritance
    (c) Chromosomal nondisjunction during gamete formation
    (d) X-linked recessive inheritance

142. Stele is constituted by all given tissues, except:
    (a) Vascular bundles   (b) Endodermis
    (c) Pericycle   (d) Medulla

143. Insectivorous plants occupy the trophic level:
    (a) $T_1$   (b) $T_4$
    (c) $T_1$ and $T_3$ simultaneously (d) $T_2$ only

144. Which step of Krebs cycle operates substrate level phosphorylation?
    (a) α-ketoglutarate → succinyl CoA
    (b) Succinyl CoA → succinate
    (c) Succinate → fumarate
    (d) Fumarate → malate

145. Which type of spatial patterns is noticed in ecosystem structure?
    (a) Zonation   (b) Stratification
    (c) Zonation and stratification
    (d) Zonation, stratification and distribution

146. Which enzyme catalyses the crossing over and exchange of genetic material between homologous chromosomes in meiosis?
    (a) Polymerase   (b) Phosphorylase
    (c) Recombinase   (d) Transferase

147. Pollen grains can be stored for several years in liquid nitrogen having a temperature of
    (a) –196°C   (b) –80°C   (c) –120°C   (d) –160°C

148 Read the following statements and select the correct option.
    **Statement A:** In *Cycas*, both male strobilus and megasporophylls present on different plants.
    **Statement B:** In *Cycas*, both male strobilus and megasporophylls present on the same plants.
    (a) Only statement A is incorrect
    (b) Only statement B is incorrect
    (c) Both statements A and B are correct.
    (d) Both statements A and B are incorrect.

149 Match the following columns and select the correct option.

| | Column I | | Column II |
|---|---|---|---|
| A. | Bacteriophage φ × 174 | 1. | $4.6 \times 10^6$ bp |
| B. | Bacteriophage lambda | 2. | 48502 bp |
| C. | *Escherichia coli* | 3. | 5386 nucleotides |
| D. | Human DNA | 4. | $3.3 \times 10^9$ bp (haploid content) |

|  | A | B | C | D |
|---|---|---|---|---|
| (a) | 3 | 1 | 4 | 2 |
| (b) | 3 | 2 | 1 | 4 |
| (c) | 4 | 3 | 1 | 2 |
| (d) | 3 | 4 | 2 | 1 |

150 If scientists succeed in introducing apo-mictic gene into hybrid varieties of crops which of the following can be expected?
    (a) There will be segregation of the desired characters only in the progeny.
    (b) Polyembryony will be seen and each seed will produce many plantlets.
    (c) Seeds of hybrid plants will show longer dormancy.
    (d) Farmers can keep on using the seeds produced by the hybrids to raise new crop year after year.

# ZOOLOGY

## Section A

151. Which one of the following pairs of animals comprises jawless fishes ?
    (a) Mackerals and Rohu.   (b) Lampreys and hagfishes
    (c) Guppies and hagfishes   (d) Lampreys and eels.

152. Saddle joint is present between:
    (a) Humerus and pectoral girdle
    (b) Atlas and axis
    (c) Between carpal and metacarpal
    (d) Between the carpals

153. Which animals out of the following are radially symmetrical?
    (a) Cockroach and earthworm
    (b) Starfish and Hydra
    (c) Taenia and Ascaris
    (d) Sepia and Pila

154. Which of the following does not favour the formation of large quantities of dilute urine?
    (a) Alcohol   (b) Caffeine   (c) Renin
    (d) Atrial-Natriuretic factor

155. Which one of the following diseases cannot be cured using antibiotics?
    (a) Pneumonia   (b) Cholera
    (c) Common cold   (d) Typhoid

156. The terga, sterna and pleura of cockroach body are joined by:
    (a) Cartilage   (b) Cementing glue
    (c) Muscular Tissue   (d) Arthrodial membrane

157. The main function of mammalian corpus luteum is to produce:
    (a) Estrogen only
    (b) Progesterone
    (c) Human chorionic gonadotropin
    (d) Relaxin only

158. Name the ion responsible for unmasking of active sites for myosin for cross-bridge activity during muscle contraction.
    (a) Calcium
    (b) Magnesium
    (c) Sodium
    (d) Potassium

159. Vital capacity of lungs is correctly represented:
    (a) TV + IRV + ERV
    (b) TV + IRV + RV
    (c) TV + ERV
    (d) IRV + ERV

160. Heart attack is also known as:
    (a) Heart block
    (b) Myocardial infarction
    (c) Cardiac arrest
    (d) Heart failure

161. The body having meshwork of cells, internal cavities lined with food filtering flagellated cells and indirect development are the characteristics of phylum:
    (a) Coelenterata
    (b) Porifera
    (c) Mollusca
    (d) Protozoa

162. A foetal sex determination test based on the chromosomal pattern in the amniotic fluid surrounding the developing embryo, called amniocentesis, cannot determine
    (a) Cleft palate
    (b) Down's syndrome
    (c) Haemophilia
    (d) Sickle-cell anaemia

163. In clinical diagnosis a girl child was identified as sufferer of a genetic disorder, but none of her parents are suffering from this disease. The disease is most probably
    (a) Colour blindness
    (b) Haemophilia
    (c) Myotonic dystrophy
    (d) Thalassemia

164. Select the incorrect match regarding hormones and their chemical nature.

| (a) | Pancreatic hormones | Polypetides |
|---|---|---|
| (b) | Thyroid hormones | Steroidal |
| (c) | Hormones of adrenal medulla | Amino acid derivatives |
| (d) | Pituitary hormones | Proteinaceous |

165. Read the following statements.
    (1) Myelinated nerve fibres enveloped with Schwann cells are found in spinal and cranial nerves.
    (2) Unmyelinated nerve fibres are enclosed within Schwann cells and are commonly found in autonomous and somatic neural systems.
    (3) Midbrain, pons and medulla oblangata form the brain stem.
    (4) Cornea is the outer proteinaceous layer and is the least sensitive part of eye.
    How many of the given statements are wrong?
    (a) Two
    (b) One
    (c) Three
    (d) Zero

166. Infection of *Ascaris* usually occurs by:
    (a) Tse tse fly
    (b) Mosquito bite
    (c) Drinking water containing eggs of *Ascaris*
    (d) Eating imperfectly cooked pork

167. Which is not the character of red skeletal muscle fibres ?
    (a) It has high number of mitochondria.
    (b) It works for short duration.
    (c) It has high myoglobin content.
    (d) It carries out aerobic oxidation.

168. Which one of the following hormone is not involved in sugar metabolism?
    (a) Glucagon
    (b) Cortisone
    (c) Aldosterone
    (d) Insulin

169. Which of the following is correct regarding AIDS causative agent HIV?
    (a) HIV is enveloped virus containing one molecule of single stranded RNA and one molecule of reverse transcriptase.
    (b) HIV is enveloped virus that contains two identical molecules of single stranded RNA and two molecules of reverse transcriptase.
    (c) HIV is unenveloped retrovirus.
    (d) HIV does not escape but attacks the acquired immune response.

170. Periodic abstinence involves avoiding of coitus from:
    (a) Day 10-15 of menstrual cycle
    (b) Day 10-17 of menstrual cycle
    (c) Day 5-10 of menstrual cycle
    (d) Day 14-28 of menstrual cycle

171. Which of the following sets of disease are viral?
    (a) Cholera, Mumps, Chikungunya
    (b) Flu, Chikungunya, Measles, Hepatitis
    (c) Dengue, Diphtheria, Leprosy, Small pox
    (d) Chicken pox, Flu, Pneumonia, Plague

172. A man with blood group 'A' marries to woman with blood group 'B'. If their child has blood group 'O' then what could be their genotype?
    (a) Both are homozygous.
    (b) Man is homozygous while woman is Heterozygous.
    (c) Both are heterozygous.
    (d) Man is heterozygous while woman is Homozygous.

173. Which one of the following pairs of animals is similar to each other pertaining to the feature stated against them ?
    (a) *Pteropus* and *Ornithorhyncus* – viviparity
    (b) Garden lizard and Crocodile – three chambered heart
    (c) *Ascaris* and *Ancylostoma* – metameric segmentation
    (d) Sea horse and Flying fish – cold blooded (poikilothermal)

174. In human adult females, oxytocin:
    (a) Causes strong uterine contractions during parturition.
    (b) Is secreted by anterior pituitary.
    (c) Stimulates growth of mammary glands.
    (d) Stimulates pituitary to secrete.

175. Which of these is not an important component of initiation of parturition in humans?
    (a) Increase in estrogen and progesterone ratio.
    (b) Synthesis of prostaglandins.
    (c) Release of oxytocin.
    (d) Release of Prolactin.

176. Which one of the following options correctly represents the lung conditions in emphysema and asthma, respectively?
    (a) Decreased respiratory surface; Inflammation of bronchioles.
    (b) Inflammation of bronchioles; Decreased respiratory.
    (c) Increased respiratory surface; Inflammation of bronchioles.
    (d) Increased number of bronchioles; Increased respiratory.

177. 70 to 80 percent of electrolytes and water are reabsorbed in:
    (a) Distal convoluted tubule
    (b) Proximal convoluted tubule
    (c) Ascending limb of Loop of Henle
    (d) Descending limb of Loop of Henle

178. Obturator foramen is present in:
    (a) Between right and left atria
    (b) Pelvic girdle
    (c) Between third and fourth ventricles of brain
    (d) Occipital bone of cranium

179. Which one of the following hormones though synthesised elsewhere, is stored and released by the master gland?
    (a) Melanocyte stimulating hormone
    (b) Antidiuretic hormone
    (c) Luteinizing hormone
    (d) Prolactin

180. Which is the correct order in which the proteins participate in clotting of blood?
(a) Prothrombinase → Prothrombin → Thromboplastin → Thrombin
(b) Thromboplastin → Prothrombinase → Prothrombin → Thrombin
(c) Prothrombin → Thromboplastin → Thrombin → Prothrombinase
(d) Thrombin → Prothrombin → Thromboplastin → Prothrombinase

181. A DNA segment has 75 cytosine and 40 thymine nucleotides. What shall be the total number of phosphates in the DNA segment?
(a) 115    (b) 230    (c) 75    (d) 220

182. Bowman's glands are located in:
(a) Cortical nephron    (b) Olfactory epithelium
(c) Hypodermis of skin    (d) External auditory canal

183. According to the central dogma, the flow of genetic information is unidirectional, i.e.,

Replication (DNA $\xrightarrow{'A'}$ mRNA $\xrightarrow{\text{Translation}}$ 'B'

Fill the blanks 'A' and 'B' by choosing correct option.
(a) 'A' - Mutation; 'B' - Protein
(b) 'A' - Transcription; 'B' - Amino acids
(c) 'A' - Elongation; 'B' - Polypeptide
(d) 'A' - Transcription; 'B' - Protein

184. Medullary osmolarity gradient in kidney is maintained mainly by
(a) NaCl and urea    (b) Ketone bodies and $H^+$
(c) $NH_3$ and urea    (d) $H^+$ and NaCl

185. Which one is mainly and directly responsible for reabsorption of $Na^+$ in distal parts of nephron?
(a) Angiotensin II    (b) Atrial natriuretic factor
(c) Aldosterone    (d) ADH

## Section B

186. Industrial melanism is an example of:
(a) Neo Darwinism    (b) Natural selection
(c) Mutation    (d) Neo Lamarckism

187. Select the correct match of the digested products in humans given in **column I** with their absorption site and mechanism in **column II**

|     | Column I | Column II |
| --- | --- | --- |
| (a) | Glycine, lucose | Small intestine, active absorption |
| (b) | Fructose, $Na^+$ | Small intestine, passive absorption |
| (c) | Glycerol, fatty acids | Duodenum, move as chylomicrons |
| (d) | Cholesterol, maltose | Large intestine, active absorption |

188. During cellular respiration, which stage produces the majority of ATP in eukaryotic cells?
(a) Glycolysis
(b) Krebs cycle (Citric Acid Cycle)
(c) Electron Transport Chain (ETC)
(d) Pyruvate Decarboxylation

189. Choose the unisexual animal:
(a) Earthworm    (b) Leech
(c) Tapeworm    (d) Cockroach

190. A DNA molecule of E. coli in which both strands have $^{14}N$ is allowed to replicate in an environment containing $^{15}N$. What will be the exact number of DNA molecules that contain the $^{14}N$ after three replications?
(a) one    (b) two    (c) four    (d) eight

191. According to Darwin, organic evolution is due to:
(a) Competition with closely related species.
(b) Interspecific competition.
(c) Intraspecific competition.
(d) Reduced feeding efficiency in one species due to the presence of another species.

192. Which of the following cells during gametogenesis is normally diploid?
(a) Spermatid    (b) Spermatogonia
(c) Second polar body    (d) Secondary oocyte

193. Which two scientists independently gave the chromosomal theory of sex determination in the same year?
(a) Mendel and Henking    (b) Johannsen and Punnet
(c) Nettie Stevens and EB Wilson
(d) Beecher and Franklin

194. _____ is a segment of DNA that codes for a specific polypeptide.
(a) Operon    (b) Cistron    (c) Muton    (d) Codon

195. Industrial melanism observed in moth, Biston bitularia shows which type of natural selection?
(a) stabilising  (b) directional(c) disruptive (d) artificial

196. 'Theory of Natural Selection' is based on several observations. Which of the following observation is incorrect?
(a) There are limited natural resources.
(b) Population are stable in size except for seasonal fluctuations.
(c) Similar characteristics in members of a population.
(d) Theoretically, population grows exponentially if everybody reproduces maximally.

197. Choose the correctly matched pair
(a) Polyploidy – Increase in a whole set of chromosomes
(b) Allopolyploidy – Containment of multiple chromosome sets desired from a single species.
(c) Autopolyploidy – Containment of multiple chromosome sets desired from different species.
(d) Aneuploidy – Presence of normal number of chromosomes in a all.

198. Frederick Griffith's experiment with *Streptococcus pneumoniae* (bacterium) reveals about the 'transforming principle'. His series of experiments and observations are given below. Read carefully.
(1) S-strain bacteria → Injected into mice → Mice died
(2) R-strain bacteria → Injected into mice → Mice died
(3) S-strain (heat killed) → Injected into mice → Mice lived
(4) S-strain (heat killed) + R-strain (live) → Injected into mice → Mice died
How many of the above observations are incorrect?
(a) 1    (b) 2    (c) 3    (d) 4

199. Which theory of origin of life was rejected by Louis Pasteur?
(a) Theory of special creation
(b) Theory of panspermia
(c) Theory of spontaneous generation
(d) Theory of chemical evolution

200. Haploid-diploid method of sex-determination is seen in some insects. How many of the insects listed in the box shows this method?

> Ants, Grasshopper, Honeybees, *Drosophila*, Wasps, Cockroach

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