Manipal
Medical Entrance Exam
Solved Paper 2011

Physics

1. In Young's experiment, the wavelength of red light is 7800 Å and that of blue light is 5200 Å. The value of n for which $(n+1)$th blue band coincides with nth red band is
(a) 1 (b) 2
(c) 3 (d) 4

2. The hubble constant has the dimensions of
(a) time (b) time^{-1}
(c) length (d) mass

3. A boy has 60 kg weight. He wants to swim in a river with the help of a wooden log. If relative density of wood is 0.6. What is the minimum volume of wooden log?
(Density of river water is 1000 kg/m^3)
(a) 0.66 m^3 (b) 150 m^3
(c) $\frac{3}{1}$ m^3 (d) $\frac{3}{20}$ m^3

4. When a triode is used as an amplifier the phase difference between the input signal voltage and output is
(a) zero (b) π (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{3}$

5. For Balmer series that lies in the visible region, the shortest wavelength corresponds to quantum number
(a) $n=1$ (b) $n=2$
(c) $n=3$ (d) $n=\infty$

6. A double convex lens ($\mu = 3/2$) of focal length 20 cm is totally immersed in water ($\mu = 4/3$). Its focal length now will be
(a) 20 cm (b) 30 cm
(c) 40 cm (d) 10 cm

7. Under which of the following conditions is the law $pV = RT$ obeyed most closely by a real gas?
(a) High pressure and high temperature
(b) Low pressure and low temperature
(c) Low pressure and high temperature
(d) High pressure and low temperature

8. An artificial satellite revolves around the earth in a circular orbit with a speed v. If m is the mass of the satellite, its total energy is
(a) $\frac{1}{2}mv^2$ (b) $-\frac{1}{2}mv^2$
(c) $-mv^2$ (d) $\frac{3}{2}mv^2$

9. When the intermolecular distance decreases due to compressive force, there is
(a) zero resultant force between molecules
(b) repulsive force between molecules
(c) attractive force between molecules
(d) no force between molecules

10. A 0.5 kg ball moves in a circle of radius 0.4 m at a velocity of 4 m/s. The centripetal force on the ball is
(a) 10 N (b) 20 N (c) 40 N (d) 80 N

11. In the unmagnetized state, magnetic domains of a magnetic substance are oriented at
(a) 60° (b) 90°
(c) randomly (d) 150°

12. If the radius of the earth were to shrink by 1%, its mass remaining the same, the acceleration due to gravity on the earth's surface would
(a) decrease by 1%
(b) remain unchanged
(c) increase by 1%
(d) increase by 2%

13. One-fourth length of a spring of force constant k is cut away. The force constant of the remaining spring will be
(a) $\frac{3}{4}k$ (b) $\frac{4}{3}k$
(c) k (d) $4k$

with amplitude of 0.1 m. At a certain instant when its displacement is 0.02 and its acceleration is 0.5 m/s^2. The maximum velocity of the particle is (in m/s)
(a) 0.01 (b) 0.05
(c) 0.5 (d) 0.25

15. The area of cross-section of a steel wire ($Y = 2.0 \times 10^{11}$ N/m^2) is 0.1 cm^2. The force required to double its length will be
(a) 2×10^{12} N (b) 2×10^{11} N
(c) 2×10^{10} N (d) 2×10^{6} N

16. If a glass rod is dipped in mercury and withdrawn out, the mercury does not wet the rod because
(a) angle of contact is acute
(b) cohesion force is more
(c) adhesion force is more
(d) density of mercury is more

17. Gas exerts pressure on the walls of the container because gas
(a) has weight
(b) molecules have momentum
(c) molecules collide with each other
(d) molecules collide with the walls of the container

18. The bulk modulus of an ideal gas at constant temperature is
(a) equal to its pressure
(b) equal to its volume
(c) equal to $p/2$
(d) cannot be determined

19. If in an isothermal process the volume of ideal gas is halved, then we can say that
(a) internal energy of the system decreases
(b) internal energy of the system increases
(c) work done by the gas is negative
(d) work done by the gas is positive

20. X-ray beam of intensity I_0 passes through an absorption plate of thickness d. If absorption coefficient of material of plate is μ, the correct statement regarding the transmitted intensity I of X-ray is
(a) $I = I_0(I - e^{-\mu d})$ (b) $I = I_0 e^{-\mu d}$
(c) $I = I_0(I - e^{d/\mu})$ (d) $I = I_0 e^{-\mu/e}$

21. A 2 μF capacitor is charged to 100 V and then its plates are connected by a conducting wire, the heat produced is
(c) 0.01 J (d) 0.00 J

22. Gauss is unit of which quantity?
(a) H (b) B
(c) ϕ (d) I

23. A body starts to fall freely under gravity. The distances covered by it in first, second and third seconds are in ratio
(a) 1 : 3 : 5 (b) 1 : 2 : 3
(c) 1 : 4 : 9 (d) 1 : 5 : 6

24. Two bodies of masses m and $2m$ have same momentum. Their respective kinetic energies K_1 and K_2 are in the ratio
(a) 1 : 2 (b) 2 : 1
(c) $1 : \sqrt{2}$ (d) 1 : 4

25. If the velocity of projection is increased by 1% (other things remaining constant) the horizontal range will increase by
(a) 1% (b) 2%
(c) 4% (d) 8%

26. Light of frequency ν is incident on a substance of threshold frequency $\nu_0 (\nu_0 < \nu)$. The energy of the emitted photoelectron will be
(a) $h(\nu - \nu_0)$ (b) h/ν
(c) $he(\nu - \nu_0)$ (d) h/ν_0

27. Line spectrum contains information about the
(a) atoms of the prism
(b) atoms of the source
(c) molecules of the source
(d) atoms as well as molecules of the source

28. A radioactive material has a half-life of 8 yr. The activity of the material will decrease to about $\frac{1}{8}$ th of its original value in
(a) 256 yr (b) 128 yr
(c) 64 yr (d) 24 yr

29. The ratio of forward bias to reverse bias resistance of p-n junction diode is
(a) $10^{-1}:1$ (b) $10^{-2}:1$
(c) $10^{-3}:1$ (d) $10^{-4}:1$

30. The time of revolution of an electron around a nucleus of charge Ze in nth Bohr's orbit is directly proportional to
(a) n (b) $\frac{n^3}{Z^2}$
(c) $\frac{n^2}{Z}$ (d) $\frac{Z}{n}$

31. The average kinetic energy of thermal neutron is of the order of
(a) 0.03 eV (b) 3 eV
(c) 3 keV (d) 3 MeV
(Boltzmann's constant $k_B = 8 \times 10^{-5}$ eV/K)

32. If the velocity of sound in air is 336 m/s. The maximum length of a closed pipe that would produce a just audible sound will be
(a) 3.2 cm (b) 4.2 m
(c) 4.2 cm (d) 3.2 m

33. The phenomenon of rotation of plane polarized light is called
(a) Kerr effect (b) double refraction
(c) optical activity (d) dichroism

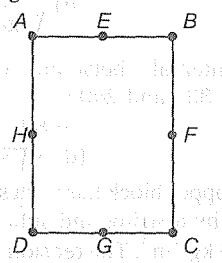
34. Infrared radiation was discovered in 1800 by
(a) William Wallaston (b) William Herschel
(c) Wilhelm Roentgen (d) Thomas Young

35. White light is passed through a dilute solution of potassium permagnate. The spectrum produced by the emergent light is
(a) band emission spectrum
(b) line emission spectrum
(c) band absorption spectrum
(d) line absorption spectrum

36. The ionization energy of Li^{2+} is equal to
(a) 9 hcR (b) 6 hcR
(c) 2 hcR (d) hcR

37. The error in the measurement of radius of sphere is 0.3%, what is percentage error in the measurement of its volume?
(a) 0.3% (b) 0.6%
(c) 0.9% (d) $\frac{4}{3}\pi(0.3)^3$

38. In a rectangle $ABCD$ ($BC = 2AB$), the moment of inertia along axis will be minimum through



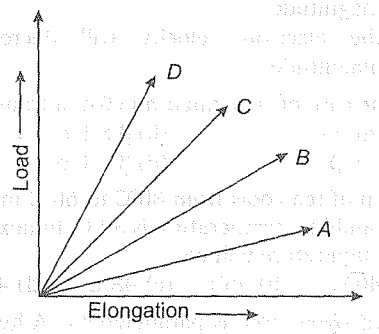
(a) BC (b) BD
(c) HF (d) EG

39. A child is sitting on a swing. Its minimum and maximum heights from the ground are 0.75 m and 2 m respectively, its maximum speed will be
(a) 5 m/s (b) 8 m/s
(c) 10 m/s (d) 15 m/s

40. An oscillator is basically an amplifier with gain
(a) less than unity (b) more than unity
(c) zero (d) 0.5

41. Which one of the following represents simple harmonic motion?
(a) $x^2 = a + bv$ (b) $x = \sqrt{a + bv^2}$
(c) $x = a - bv$ (d) $x = \sqrt{a - bv^2}$

42. The load *versus* elongation graph of four wires of same length and of the same material is shown in figure. The thinnest wire is represented by the line



(a) OA (b) OB
(c) OC (d) OD

43. An ideal choke of 10 H is joined in series with resistance of 5 Ω and a battery of 5 V. The current in the circuit in 2 s after joining in ampere will be
(a) e^{-1} (b) $1 - e^{-1}$
(c) $1 - e$ (d) e

44. Generally semiconductor can be used safely between the temperatures
(a) – 75°C and 200°C (b) 0°C and 75°C
(c) – 25°C and 300°C (d) – 40°C and 1000°C

45. In a given process on an ideal gas $dW = 0$ and $dQ < 0$, then for the gas
(a) the temperature will decrease
(b) the volume will increase
(c) the pressure will remain constant
(d) the temperature will increase

46. The wavelength of light in air is 6000 Å and in medium its value is 4000 Å. It means that the refractive index of that medium with respect to air is
(a) 1.2 (b) 2.4
(c) 0.66 (d) 1.5

(a) towards the base
(b) away from base
(c) parallel to base
(d) towards or away from base depending on the location

48. A uniform electric field and a uniform magnetic field are produced, pointed in the same direction. An electron is projected with its velocity pointing in the same direction
(a) the electron will turn to its left
(b) the electron will turn on its right
(c) the electron velocity will increase in magnitude
(d) the electron velocity will decrease in magnitude

49. In the case of constant α and β of a transistor
(a) $\alpha\beta = 1$ (b) $\beta > 1, \alpha < 1$
(c) $\alpha = \beta$ (d) $\beta < 1, \alpha > 1$

50. A cup of tea cools from 80°C to 60°C in 1 min. The ambient temperature is 30°C. In next 1 min its temperature will be
(a) 40°C (b) 45°C (c) 48°C (d) 42°C

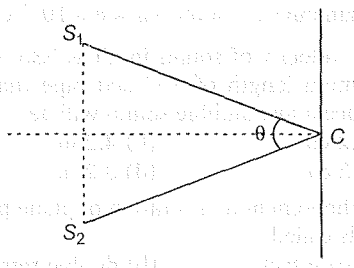
51. A hydrogen atom is paramagnetic. A hydrogen molecule is
(a) diamagnetic
(b) paramagnetic
(c) ferromagnetic
(d) antiferromagnetic

52. A DC circuit contains 10 Ω of resistance in series with 10 H coil. The impedance of the circuit is
(a) 10 Ω (b) 20 Ω
(c) 1 Ω (d) zero

53. Critical temperature of CO_2 is 31.2°C. In summer, the room temperature is 40°C
(a) CO_2 cannot be liquefied
(b) can be liquefied with increase of pressure
(c) can be liquefied with decrease of pressure
(d) can be liquefied if temperature of CO_2 is decreased below 31.2°C

54. In a meter bridge with a standard resistance of 5 Ω in the left gap, the ratio of balancing lengths on the meter bridge wire is 2 : 3. The unknown resistance is
(a) 3.3 Ω (b) 7.5 Ω
(c) 10 Ω (d) 15 Ω

used and $\angle S_1CS_2 = \theta$, then the fringe width will be



(a) $\frac{\lambda}{\theta}$ (b) $\frac{\lambda}{2\theta}$
(c) $\lambda\theta$ (d) $\frac{2\lambda}{\theta}$

56. If at the same temperature and pressure, the densities of two diatomic gases are d_1 and d_2 respectively, the ratio of mean kinetic energy per molecule of gases will be
(a) 1 : 1 (b) $d_1 : d_2$
(c) $\sqrt{d_1} : \sqrt{d_2}$ (d) $\sqrt{d_2} : \sqrt{d_1}$

57. In AC circuit a resistance of R Ω is connected in series with an inductance L. If the phase difference between the current and voltage is 45°, the inductive reactance will be
(a) $R/2$ (b) $R/4$
(c) R (d) None of these

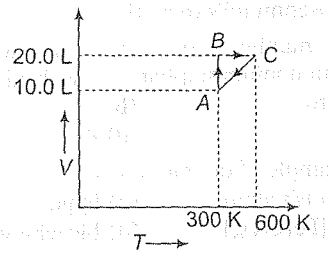
58. A metallic wire of density d of floats in water. The maximum radius of the wire, so that it may not sink is
(a) $\sqrt{2\pi\, dgT}$ (b) $\sqrt{\frac{2T}{\pi dg}}$
(c) $\sqrt{\frac{\pi dg}{2T}}$ (d) $\sqrt{\frac{2Tg}{\pi d}}$

59. Musical interval between two notes of frequencies 320 and 240 is
(a) 1.33 (b) 80
(c) 7 (d) 1.78

60. A cubical copper block has each side 2.0 cm. It is suspended by a string and submerged in oil of density 820 kg/m^3. The tension in the string is
(density of copper 8920 kg/m^3, $g = 10$ m/s^2)
(a) 0.648 N (b) 0.712 N
(c) 0.066 N (d) 1.37 N

Chemistry

1. Bond polarity of diatomic molecule is because o
   (a) difference in electron affinities of two atoms
   (b) difference in electronegativities of two atoms
   (c) difference in ionisation potentials
   (d) All of the above
2. The structure of PF_5 molecule is
   (a) square planar
   (b) tetrahedral
   (c) trigonal bipyramidal
   (d) pentagonal bipyramidal
3. A solid is made of two elements X and Z. The atoms Z are in CCP arrangement while the atoms X occupy all the tetrahedral sites. What is the formula of the compound?
   (a) XZ (b) XZ_2 (c) X_2Z (d) X_2Z_3
4. This graph expresses the various steps of the system containing 1 mole of gas. Which type of process system has when it moves from C to A?



   (a) Isochoric (b) Isobaric
   (c) Isothermal (d) Cyclic
5. During the evaporation of liquid
   (a) the temperature of the liquid will rise
   (b) the temperature of the liquid will fall
   (c) may rise or fall depending on the nature
   (d) the temperature remains unaffected
6. A system absorb 600 J of heat and work equivalent to 300 J on its surroundings. The change in internal energy is
   (a) 300 J (b) 400 J
   (c) 500 J (d) 600 J
7. The enthalpies of combustion of carbon and carbon monoxide are – 393.5 and – 283 kJ mol^{-1} respectively. The enthalpy of formation of carbon monoxide per mole is
   (a) – 676.9 kJ (b) 676.5 kJ
   (c) 110.5 kJ (d) – 110.5 kJ
8. A reversible chemical reaction having two reactants in equilibrium. If the concentrations of the reactants are doubled, then the equilibrium constant will
   (a) be halved (b) also be doubled
   (c) reamins the same (d) None of these
9. For which order half-life period is independent of initial concentration?
   (a) Zero (b) First (c) Second (d) Third
10. Ammonia gas dissolves in water to form NH_4OH. In this reaction water acts as
   (a) a conjugate base (d) a non-polar solvent
   (c) an acid (d) a base
11. If acetic acid is mixed with sodium acetate then H^+ ion concentration will be
   (a) increased (b) decreased
   (c) remains unchanged (d) pH decreased
12. A weak acid HX has the dissociation constant 1×10^{-5} M. It forms a salt NaX on reaction with alkali. The degree of hydrolysis of 0.1 M solution of NaX is
   (a) 0.0001% (b) 0.01%
   (c) 0.1% (d) 0.15%
13. The electron affinity of halogens are F = 322, Cl = 349, Br = 324, I = 295 kJ mol^{-1}. The higher value for Cl as compared to that of F is due to
   (a) weaker electron-electron repulsion in Cl
   (b) higher atomic radius of F
   (c) smaller electronegativity of F
   (d) more vacant p-subshell in Cl
14. The first ionization potential of Na, Mg, Al and Si are in the order,
   (a) Na > Mg > Al > Si (b) Na > Mg > Al < Si
   (c) Na < Al < Mg < Si (d) Na < Mg < Al > Si
15. NaCN is sometimes added in the froth floatation process as a depressant when ZnS and PbS minerals are expected because
   (a) ZnS forms soluble complex $Na_2[Zn(CN)_4]$ while PbS forms froth
   (b) $Pb(CN)_2$ is precipitated while no effect on ZnS
   (c) PbS forms soluble complex $Na_2[Pb(CN)_4]$ while ZnS form froth
   (d) NaCN is never added in froth floatation process

(c) $CuCO_3 \cdot Cu(OH)_2$ (d) Cu_2O

17. White phosphorus (P_4) has
(a) four P—P single bonds
(b) four lone pair of electrons
(c) PPP angle of 60°
(d) light P—P single bonds

18. Which of the following is most polarised?
(a) Kr (b) Ar (c) He (d) Xe

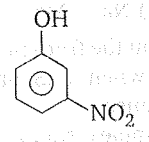
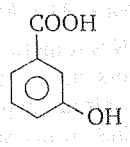
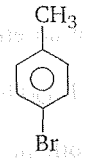
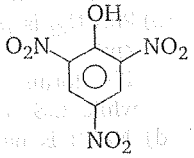
19. On dissolving moderate amount of sodium metal in liquid NH_3 at low temperature, which one of the following does not occur?
(a) Na^+ ions are formed in the solution
(b) Blue coloured solution is obtained
(c) Liquid NH_3 becomes good conductor of electricity
(d) Liquid ammonia remains diamagnetic

20. Which of the following has highest ionic radii?
(a) Fe^{3+} (b) Cr^{3+}
(c) Mn^{3+} (d) Co^{3+}

21. The basic character of the transition metal monoxides follows the order
(At no. of Ti = 22, V = 23, Cr = 24, Fe = 26)
(a) TiO > VO > CrO > FeO
(b) VO > CrO > TiO > FeO
(c) CrO > VO > FeO > TiO
(d) TiO > FeO > VO > CrO

22. Which of the following is not an element?
(a) 22 carat gold (b) Graphite
(c) Diamond (d) Rhombic sulphur

23. Which of the following weights less when weighted in magnetic field?
(a) $SrCl_3$ (b) $FeCl_3$
(c) $TiCl_3$ (d) VCl_3

24. Picric acid is
(a) 
(b) 
(c) 
(d) 

temperature
(a) 1-hydroxy butane
(b) 2-hydroxy butane
(c) 2-hydroxy-2-methyl propane
(d) 1-hydroxy-2-methyl propane

26. $A \xrightarrow{HCN} B \xrightarrow{H_3O^+}$ Lactic acid.
Identify *A*
(a) HCHO (b) CH_3CHO
(c) C_6H_5CHO (d) CH_3COCH_3

27. Which one of the following undergoes reaction with 50% sodium hydroxide solution to give the corresponding alcohol and acid?
(a) Phenol (b) Benzaldehyde
(c) Butanal (d) Benzoic acid

28. Catalyst $SnCl_2/HCl$ is used in
(a) Stephen's reduction
(b) Cannizzaro's reaction
(c) Clemmensen reduction
(d) Rosenmund's reduction

29. The number of ions formed when cuprammonium sulphate is dissolved in water is
(a) zero (b) 1
(c) 2 (d) 4

30. An example of double salt is
(a) potash alum (b) hypo
(c) $K_4[Fe(CN)_6]$ (d) bleaching powder

31. In $Fe(CO)_5$, the Fe—C bond possesses
(a) π character only
(b) both σ and π characters
(c) ionic character
(d) σ character only

32. Formic acid and acetic acid are distinguished by
(a) $NaHCO_3$ (b) $FeCl_3$
(c) Victor Mayer test (d) Tollen's reagent

33. The main product obtained in the reaction of acetamide and HNO_2 is
(a) CH_3CN (b) CH_3NC
(c) CH_3NH_2 (d) CH_3COOH

34. $CaC_2 + H_2O \longrightarrow A \xrightarrow{H_2SO_4/HgSO_4} B$
Identify *A* and *B* in the given reaction
(a) C_2H_2 and CH_3CHO
(b) CH_4 and HCOOH
(c) C_2H_4 and CH_3COOH
(d) C_2H_2 and CH_3COOH

35. Which one of the following has the minimum boiling point?
(a) *n*-butane (b) 1-butyne
(c) 1-butene (d) Isobutene

36. Which of these do not form Grignard reagent?
(a) CH_3Cl (b) CH_3F (c) CH_3Br (d) CH_3I

37. In alkaline hydrolysis of a tertiary halide by aqueous alkali if concentration of alkali is doubled, then the reaction
(a) will be doubled (b) will be halved
(c) will remain constant (d) None of the above

38. The functional group which is found in amino acid is
(a) —COOH (b) $—NH_2$ group
(c) $—CH_3$ group (d) Both (a) and (b)

39. Glucose and manose are
(a) anomers (b) epimers
(c) ketohexoses (d) disaccharides

40. T[redacted] antiseptic present in Dettol is
(a) qodine (b) chloroxylenol
(c) bithional (d) None of these

41. Reduction of nitrobenzene in the presence of Zn/NH_4Cl gives
(a) hydrazobenzene
(b) aniline
(c) azobenzene
(d) N-phenyl hydroxylamine

42. Amongst the following the most basic compound is
(a) *p*-nitroaniline (b) acetanilide
(c) aniline (d) benzylamine

43. Reaction of aniline with acetyl chloride in the presence of NaOH gives
(a) acetanilide
(b) *p*-chloroaniline
(c) a red dye
(d) aniline hydrochloride

44. A metal oxide has the formula A_2O_3. It can be reduced by hydrogen to give free metal and water. 0.1596 g of this metal oxide requires 6 mg of hydrogen for complete reduction. What is the atomic weight of metal?
(a) 52.3 (b) 57.5 (c) 55.8 (d) 59.3

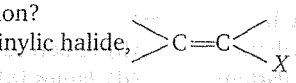
45. An electron moves away from the nucleus, its potential energy
(a) increases (b) decreases
(c) remains constant (d) None of these

46. An *f*-shell containing 6 unpaired electrons can exchange
(a) 6 electrons (b) 9 electrons
(c) 12 electrons (d) 15 electrons

47. The electronic configuration of P in H_3PO_4 is
(a) $1s^2 2s^2 2p^6 3s^2 3p^6$
(b) $1s^2 2s^2 2p^6 3s^2$
(c) $1s^2 2s^2 2p^6$
(d) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$

48. Underlined carbon is sp^3 hydridised in
(a) $CH_3\underline{C}H{=}CH_2$ (b) $CH_3—\underline{C}H_2—NH_2$
(c) $CH_3\underline{C}ONH_2$ (d) $CH_3CH_2\underline{C}N$

49. Acetaldehyde is the rearrangement product of
(a) methyl alcohol (b) allyl alcohol
(c) vinyl alcohol (d) All of these

50. Which of the following does not show S_{N_2} reaction?
(a) Vinylic halide, 
(b) Allyl chloride, $CH_2{=}CH—CH_2Cl$
(c) Chlorobenzene, C_6H_5Cl
(d) All of the above

51. *Meso* tartaric acid is optically inactive due to the presence of
(a) molecular symmetry
(b) molecular asymmetry
(c) external compensation
(d) two asymmetric C-atoms

52. IUPAC name of $CH_3OC_2H_5$ is
(a) ethoxy methane (b) methoxy ethane
(c) Both (a) and (b) (d) None of these

53. Which of the following applies in the reaction
$CH_3CHBrCH_2CH_3 \xrightarrow{\text{Alco. KOH}} ?$
(I) $CH_2CH{=}CHCH_3$ (major product)
(II) $CH_2{=}CHCH_2CH_3$ (minor product)
(a) Hofmann's rule (b) Saytzeff's rule
(c) Kharasch effect (d) Markownikoff's rule

54. In which case Raoult's law is not applicable?
(a) 1M NaCl (b) 1M urea
(c) 1M glucose (d) 1M sucrose

55. The freezing point of one molal NaCl solution assuming NaCl to be 100% dissociated in water is (molal depression constant is 1.86)
(a) – 2.72°C (b) – 3.72°C
(c) 2.72°C (d) 3.72°C

56. On passing 3 A of electricity for 50 min, 1.8 g metal deposits. The equivalent mass of metal is
(a) 9.3 (b) 19.3
(c) 38.3 (d) 39.9

$Zn + Cu^{2+} \longrightarrow Cu + Zn^{2+}$ is 1.10 V at 25°C. The emf for the cell reaction, when 0.1 M Cu^{2+} and 0.1 M Zn^{2+} solutions are used at 25°C is

(a) 1.10 V (b) – 1.10 V
(c) 2.20 V (d) – 2.20 V

58. Purple of cassius is
(a) colloidal solution of Au
(b) colloidal solution of Pt
(c) colloidal solution of Ag
(d) colloidal solution of As

Biology

1. '*Chance favours the trained mind*'. *This* statement was made by
(a) Ian Wilmut (b) Robert Koch
(c) Louis Pasteur (d) James D Watson
2. In agar plate medium having bacteriophages and bacteria, there are clear transparent area called
(a) transport parts (b) holes
(c) bacteriophages (d) plaques
3. Species is
(a) population of one type
(b) a group of interbreeding populations
(c) a group of individuals inhabiting geographical area
(d) population of individuals having same genotypes and phenotypes
4. Most of the broad spectrum antibiotics have been obtained from
(a) Actinomycetes (b) bacilli
(c) spirochaetes (d) archaebacteria
5. Which is a wrong statement?
(a) Plasmids of cyanobacteria have been used in biotechnology
(b) DNA of cyanobacteria is circular and double-stranded
(c) Cyanobacteria possess single linkage group
(d) Like bacteria, they also exhibit genetic recombination
6. Quinine, the remedy for malaria is extracted from
(a) stem of *Hevea* (b) bark of *Cinchona*
(c) bark of *Cinnamon* (d) leaves of *Ocimum*
7. Which part of *Ephedra* yields ephedrine?
(a) Flowers
(b) Stem or whole plant
(c) Leaves
(d) Roots
8. Which is not a larva of sponge?
(a) Tornaria (b) Parenchymula
(c) Stereogastrula (d) Amphiblastula
9. Which of these phenomenon is found in *Hydra*?
(a) Metamerism (b) Metabolism
(c) Metamorphosis (d) Sexual dimorphism
10. Complete metamorphosis occurs in
(a) bedbug
(b) silverfish
(c) grasshopper
(d) moths and mosquitoes
11. *Equus* rests on
(a) one digit (b) three digits
(c) four digits (d) five digits
12. Which of the following stains is used for determination of cytochrome oxidase activity in the cell?
(a) Eosin (b) Neutral red
(c) Janus green B (d) Methylene blue
13. The cell theory is not applicable to
(a) algae (b) fungi
(c) viruses (d) lichens
14. $Na^+ - K^+$ pump is found in the membranes of many cells, like nerve cells. It works against electrochemical gradient and involve an integral protein ATPase. For each molecule of ATP used
(a) 3 ions of Na^+ are pumped out and 2 K^+ are taken in
(b) 3 ions of Na^+ are taken in and 2 K^+ are pumped out

heat, so, according to Le-Chatelier principle, the amount of substance adsorbed should
(a) increase with decrease in T
(b) increase with increase in T
(c) decrease with decrease in T
(d) decrease with increase in T

60. The oxidation number of iron in Fe_3O_4 is
(a) + 2 (b) + 3
(c) $\frac{8}{3}$ (d) $\frac{2}{3}$

(c) 2 ions of Na^+ are thrown out and 3 K^+ are absorbed
(d) 3 ions of K^+ are absorbed and 3 Na^+ are pumped out

15. Which one is not protein?
(a) Actin (b) Myosin
(c) Albumin (d) Haematin

16. Maximum number of enzymes are found in
(a) herbivores (b) carnivores
(c) omnivores (d) None of these

17. A gene whose phenotypic effect kills the bearer is called
(a) lethal (b) pleiotropic
(c) supplementary (d) complementary

18. Balbiani rings are the structural features of
(a) allosomes
(b) autosomes
(c) polytene chromosomes
(d) Lampbrush chromosomes

19. Which of the following statements regarding a double helical molecule of DNA is true?
(a) Each strand is identical
(b) Each strand replicates itself
(c) Bases are perpendicular to the axis
(d) All hydroxyl groups of pentose are involved in linkage

20. The central dogma is not applicable in the case of
(a) retroviruses (b) all prokaryotes
(c) all animal viruses (d) all plant viruses

21. A gene which synthesises a repressor protein is
(a) operator gene (b) promotor gene
(c) structural gene (d) regulator gene

22. The immediate product of transcription in eukaryotes will be
(a) *hn*-RNA (b) *m*RNA
(c) *c*-DNA (d) *Sn*-RNA

23. Mr. Sharma has Bb autosomal gene pair and d allele sex-linked. What will be the proportion of Bd in sperms?
(a) 0 (b) 1/4
(c) 1/2 (d) 1/8

24. The category of molecules produced by the Miller-Urey experiment was
(a) organic polymers
(b) inorganic polymers
(c) organic monomers
(d) inorganic monomers

25. In mammals, Melanocyte Stimulating Hormone (MSH) is
(a) steroid hormone (b) vestigial hormone
(c) effective hormone (d) protein hormone

26. Birbal Sahni worked on
(a) algae (b) bryophytes
(c) fossil plants (d) angiosperms

27. Modern man differs from apes in
(a) protruding eyes
(b) thick body hairs
(c) wearing of clothes
(d) arms shorter than legs

28. *Orobanche* grow in
(a) wheat field
(b) paddy field
(c) mustard field
(d) dense tropical forest

29. Coconut fruit is dispersed by
(a) man (b) wind (c) birds (d) water

30. Outermost part of bark consisting of dead cells refers to
(a) rhytidome (b) phellem
(c) phellogen (d) phelloderm

31. In hypertonic solution, water potential of cell
(a) increases
(b) decreases
(c) first increases and then decreases
(d) remains unchanged

32. The stage of ornithine cycle at which arginase enzyme used is
(a) Ornithine ⟶ citrulline
(b) Arginine ⟶ ornithine
(c) Citrulline ⟶ Argino succinic acid
(d) Ornithine ⟶ Urea

33. Oxygen produced in photosynthesis comes from H_2O was shown by
(a) Robert Mayer (b) Ruben and Kamen
(c) Calvin (d) Robert Hill

34. The RQ of $C_{39}H_{72}O_6$ is
(a) 2.71 (b) 1.34
(c) 0.718 (d) 3.250

35. Match the following columns.

Column I	Column II
A. Skeletal tissue	1. Between muscles
B. Blood	2. Vascular tissue
C. Areolar tissue	3. Sweat glands
D. Serous glands	3. Cartilage

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

36. Compare the statement A and B.

Statement A Liver is 3-lobed in frog, 5-lobed in rabbit and 4-lobed in man.

Statement B Liver is ectodermal in origin select the correct description.

(a) Both the statements 'A' and 'B' are correct and 'B' is the correct explanation of 'A'
(b) Both the statements 'A' and 'B' are correct and 'B' is not correct explanation of A.
(c) Statement A is correct and B is wrong
(d) Statement A is wrong and B is correct

37. Which of these are never present in frog's ovary?
(a) Oogonia
(b) Corpus luteum
(c) Ovarian follicles
(d) Germinal epithelium

38. Amylopsin acts upon
(a) polypeptides
(b) polysaccharide in any medium
(c) polysaccharide in acidic medium
(d) polysaccharide in alkaline medium

39. The medullary respiratory centre is directly affected
(a) chemically (b) physically
(c) neuronally (d) None of these

40. Blood of which vessel in mammals carries least percentage of urea?
(a) Renal vein (b) Dorsal aorta
(c) Renal artery (d) Posterior vena cava

41. Match the following columns.

Column I	Column II
A. Polyuria	1. WBCs pus in urine
B. Pyuria	2. High level of uric acid in blood
C. Gout	3. Excess of urine output
D. Haematuria	3. Presence of blood (RBCs) in urine

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

(d) All of the above

43. Which of the following is not a sesamoid bone?
(a) Radius (b) Patella
(c) Fibulla (d) Pisciform

44. Rigidity that develops in the muscle after death is known as
(a) twitch (b) treppe
(c) tetanus (d) Rigor Mortis

45. Acetylcholine is
(a) neural messenger
(b) antistress hormone
(c) chemical messenger
(d) chemical transmitter

46. Heariny is controlled by
(a) cerebellum
(b) diencephalon
(c) frontal lobe of cerebrum
(d) temporal lobe of cerebrum

47. When a person suffers from a marked fall in blood pressure, it is helpful to administer to him the following hormone
(a) GH (b) insulin
(c) thyroxine (d) adrenaline

48. Nurse tissue technique is applied in
(a) pollen culture (b) embryo culture
(c) ovule culture (d) ovary culture

49. Compare the statement A and B.

Statement A Ethylene is a gas which acts as growth regulator of plants.

Statement B It is the most simple plant hormone.

(a) Both the statements 'A' and 'B' are correct and 'B' is the correct explanation of 'A'
(b) Both the statements 'A' and 'B' are correct and 'B' is not correct explanation of A.
(c) Statement A is correct and B is wrong
(d) Statement A is wrong and B is correct

50. Maximum amount of growth in root occurs
(a) in the presence of light
(b) at its apex
(c) behind the apex
(d) in the presence of soil

51. Which of the following is found inside Graafian follicle?
(a) Cortex (b) Medulla
(c) Corpus luteum (d) Membrane follicle

52. Human embryo will be called as a foetus after
(a) two months (b) six months
(c) four months (d) seven months

53. Functional kidney of frog's tadpole is
(a) pronephros (b) mesonephros
(c) holonephros (d) metanephros

54. Growth hormone activity is
(a) increased by thyroxine
(b) unaffected by thyroxine
(c) decreased by thyroxine
(d) None of the above

55. Helical contractile sheath is found in
(a) virus (b) bacterium
(c) fungus (d) bacteriophage

56. The process in which DNA of a bacterial cell is transferred into another bacterial cell by a virus is known as
(a) conjugation (b) transduction
(c) reproduction (d) transformation

57. With which one of the following organism a bacterium resembles most?
(a) Yeast (b) Virus
(c) *Amoeba* (d) *Anabaena*

58. Mycoplasma can multiply
(a) in culture media
(b) in body of living host only
(c) in bacterial cells
(d) on dead and decaying organic matter

59. The disease caused by *Entamoeba gingivalis* is spread through
(a) air (b) kissing
(c) housefly (d) *Anopheles*

60. Gill of mushroom are meant for
(a) reproduction (b) respiration
(c) assimilation (d) nutrition

61. How many microsporangia are found in a monothecous anther?
(a) Only one (b) Two
(c) Four (d) Many

62. Resin or terpentine oil is obtained from
(a) *Pinus* (b) *Cedrus*
(c) *Cycas* (d) None of these

63. The unit used for the measurement of size of cell is
(a) nm (b) mm (c) Å (d) μm

64. Which one is a prokaryote?
(a) *Spirogyra* (b) *Agaricus*
(c) Bacteriophage (d) *Streptococcus*

65. The primary function of intermediate filament is
(a) generate movement
(b) provide mechanical stability
(c) transport organelles within the cell
(d) stabilize microtubules against disassembly

66. Mitochondria will be found in abundance in cells of tissues having
(a) minimum activity (b) average activity
(c) maximum activity (d) None of these

67. The blood cell which shows phagocytosis is
(a) platelet (b) basophil
(c) monocyte (d) eosinophil

68. Zygotic meiosis occurs in
(a) *Pinus* (b) *Marchantia*
(c) *Dryopteris* (d) *Chlamydomonas*

69. Variations occur mostly due to
(a) Linkage (b) nutrition
(c) segregation (d) crossing over

70. The ovum of human female has autosomes
(a) 22 (b) 22 pairs
(c) 23 pairs (d) 44 pairs

71. Which of the following enzymes is not required for DNA synthesis?
(a) Ligase (b) DNAse
(c) DNA polymerase (d) RNA polymerase

72. A potent inhibitor of protein synthesis that act's as an analogue of aminoacyle-*t*RNA is
(a) rifampicin (b) puromycin
(c) mitomyocin (d) streptomycin

73. Loreal pit in vipers act as which receptor?
(a) Photo (b) Thermo
(c) Auditory (d) Gustatory

74. Milk glands are characteristics of
(a) all vertebrates
(b) only mammals
(c) only placental mammals
(d) only ruminants

75. Irregular flowers are
(a) asymmetrical (b) symmetrical
(c) achlamydous (d) All of these

76. Funnel-shaped style and stigma develops in
(a) *Crocus sativus* (b) *Hibiscus*
(c) *Helianthus* (d) *Gloriosa*

77. Papain (a proteolytic enzyme) is found in the latex of
(a) *Carica* (b) *Ficus*
(c) *Nerium* (d) *Euphorbia*

(b) barometer
(c) manometer
(d) auxanometer

English

Directions (Q. Nos. 1-5) *Read the following passage carefully and answer the questions given below it.*

Education, as Mahatama Gandhi described it, 'is the tool for the development of consciousness and reconstitution of society". Since Independence, India has stressed reforming and restructuring the educational system as part of State intervention. The National Policy on Education (NPE), 1986, which is hailed as a landmark in the Indian educational system, provided a comprehensive framework to guide the development of education in the country. The NPE and its Programme of Action was again updated in 1992 through similar consensual process involving all the State Governments, resource organizations and educationists.

What has been worrying the critics and educationists alike is the non-fulfilment of one of the NPE objectives : education of girl. It has been stated in the NPE that the 'Education For All' meet should have a strong gender focus as Education For All by definition is gender inclusive.

1. According to Mahatma Gandhi, education is
   (a) a medium through which people are taught to become sensitive to the realities around them
   (b) a tool to develop their conscience and Constitution
   (c) a tool to develop their understanding of the Constitution of society
   (d) an instrument to develop their society Consciously
2. The National Policy on Education provided
   (a) guidelines for the comprehension of education in the country
   (b) guidance material to develop education in the country
   (c) a comprehensive plan for the development of education in the country
   (d) comprehensive development of education in the country
3. According to the passage, critics and educationists are worried that
   (a) the education of girls is one of the objectives of NPE
   (b) the objectives of NPE have not been fulfilled
   (c) non-fulfilment of NPE leads to the education of girls
   (d) one of the objectives of NPE has not been fulfilled
4. According to the passage, 'a strong gender focus' means
   (a) a focus on the strength of gender
   (b) a focus on strong gender
   (c) a strong focus on gender bias
   (d) a focus on male-female ratio
5. In the passage, the author makes a plea for
   (a) free education
   (b) universal education
   (c) the education of men
   (d) the education of women

Directions (Q. Nos. 6-9) *Choose the alternative which can be substituted for the given group of words.*

6. A person who maliciously destroys by fire.
   (a) Antagonist (b) Activist
   (c) Terrorist (d) Incendiary
7. A house for storing grains.
   (a) Cellar (b) Store
   (c) Godown (d) Granary
8. A person very hard to please.
   (a) Obstinate (b) Unconquerable
   (c) Fastidious (d) Invincible
9. A person claiming to be superior in culture and intellect to others.
   (a) Intellectual (b) Aristocrat
   (c) Elite (d) Highbrow

(c) P3-I and P3-II (d) None of these

80. When 100% carbon is oxidized to CO_2, the efficiency of such respiration is
   (a) 40% (b) 60% (c) 90% (d) 100%

Directions (Q. Nos. 10-13) *Choose the most suitable alternative to fill in the blank.*

10. If a universal language really existed, people like tourists and businessmen would find it easier to ..... with foreigners.
(a) transact (b) communicate
(c) deal (d) exchange

11. On account of his humiliating defeat in the recent elections, he appeared unusually ..... when I called on him the other day.
(a) oppressed (b) repressed
(c) depressed (d) suppressed

12. You need ..... shoes for walking in the hills.
(a) good (b) comfortable
(c) satisfactory (d) sturdy

13. Amongst the two brothers, Sammeer being worthier often ..... the younger Deepak.
(a) dominates (b) eclipses
(c) subdues (d) overshadows

Directions (Q. Nos. 14-16) *Choose the alternative which is an improvement upon the italicised part of the sentence. If the sentence is correct as it is, choose (d) as your answer.*

14. He enjoys *to tell stories* to children.
(a) how to tell stories (b) telling stories
(c) to narrate stories (d) No improvement

15. Galileo said that the earth *revolved* around the Sun.
(a) has revolved (b) has been revolving
(c) revolves (d) No improvement

16. The matter must be considered *in* every point of view.
(a) with (b) from
(c) at (d) No improvement

Directions (Q. Nos. 17-20) *Choose the alternative which is nearest in meaning to the word given in capital letters.*

17. FOSTER
(a) Encourage (b) Fabricate
(c) Foment (d) Nurture

18. ENIGMA
(a) Elusive (b) Clear (c) Puzzle (d) Praise

19. FILTHY
(a) Healthy (b) Ugly (c) Dirty (d) Angry

20. NOSTALGIC
(a) Soothing (b) Homesick
(c) Diseased (d) Indolent

Directions (Q. Nos. 21-25) *In each of the following questions, there occurs a specific relations. Fill the vacant space (?) question mark according to that relation.*

21. Door : Bang : : Chain : ?
(a) Clank (b) Tinkle
(c) Thunder (d) Clinch

22. Bread : Wheat : : Brick : ?
(a) Cement (b) Building
(c) Clay (d) Fire

23. Mouse : Cat : : Fly : ?
(a) Horse (b) Spider
(c) Rat (d) Animal

24. Mirror : Reflection : : Water : ?
(a) Immersion (b) Conduction
(c) Refraction (d) Dispersion

25. Tennis : Court : : Boxing : ?
(a) Ring (b) Course
(c) Pool (d) Arena

Directions (Q. Nos. 26-30) *In the following questions, choose the option which shows common feature in the relationship given in each question.*

26. Sarnath : Kapilavastu : Sanchi
(a) These have ancient universities
(b) These are places having massive pillars
(c) These are linked with Lord Buddha
(d) These are famous for stone caves

27. Ebony : Rosewood : Mahogany
(a) These are hardwood trees.
(b) These are coniferous trees
(c) These yield good for fuel
(d) These are trees of temperature regions

28. Arjun : Uddhav : Sudama
(a) They were all princes
(b) They were friends of Krishna
(c) They were Pandavas
(d) They were great warriors

29. Sherlock Holmes : James Bond : Hercules Poirot
(a) They are the only detective agents
(b) They are private detectives
(c) They are agents of CBI
(d) They are characters from detective fiction

30. Goose : Duck : Stork
(a) They are white
(b) They are water birds
(c) These species are disappearing
(d) They migrate to India from Siberia.

32. The members of Rajya Sabha are elected for a term of
(a) two years (b) four years
(c) six years (d) five years

33. Who was the first Governor-General of Bengal?
(a) Robert Clive (b) Warren Hastings
(c) William Bentinck (d) Cornwallis

34. Jnanpith Award is conferred to those in the field of
(a) Literature (b) History
(c) Drama (d) Dance

35. What was Lala Lajpat Rai demonstrating against when he succumbed to police brutality?
(a) Rowlatt Act
(b) Minto-Morley Reforms
(c) Simon Commission
(d) Pitts India Act

(c) Convertible Currency System
(d) Minimum Reserve System

37. Garba is a dance form of
(a) Gujarat (b) Rajasthan
(c) Odisha (d) Asom

38. ATM stands for
(a) Automatic Teller Machine
(b) Automated Teller Machine
(c) Automatic Tally Machine
(d) Automated Tally Machanism

39. The first African National to become Secretary General of UNO was
(a) Kofi Annan (b) Butros Gali
(c) Nelson Mandela (d) Winni Mandela

40. Who was the first Indian woman to scale Mt Everest?
(a) Bachendri Pal (b) Fu Dorji
(c) Aun Sang Suu Kyi (d) Yoko Ono

Answers

Physics

1. (b)	2. (b)	3. (d)	4. (b)	5. (b)	6. (b)	7. (c)	8. (b)	9. (b)	10. (b)
11. (c)	12. (d)	13. (b)	14. (c)	15. (d)	16. (b)	17. (b)	18. (a)	19. (c)	20. (b)
21. (c)	22. (c)	23. (a)	24. (b)	25. (b)	26. (a)	27. (a)	28. (d)	29. (d)	30. (b)
31. (a)	32. (b)	33. (c)	34. (b)	35. (c)	36. (a)	37. (c)	38. (d)	39. (a)	40. (b)
41. (d)	42. (a)	43. (b)	44. (b)	45. (a)	46. (d)	47. (a)	48. (d)	49. (b)	50. (c)
51. (a)	52. (a)	53. (b)	54. (b)	55. (a)	56. (a)	57. (c)	58. (b)	59. (a)	60. (a)

Chemistry

1. (b)	2. (c)	3. (c)	4. (b)	5. (b)	6. (a)	7. (d)	8. (c)	9. (b)	10. (c)
11. (b)	12. (b)	13. (a)	14. (c)	15. (a)	16. (c)	17. (c)	18. (d)	19. (d)	20. (b)
21. (a)	22. (a)	23. (a)	24. (d)	25. (c)	26. (b)	27. (b)	28. (a)	29. (c)	30. (a)
31. (b)	32. (d)	33. (d)	34. (a)	35. (d)	36. (b)	37. (c)	38. (d)	39. (b)	40. (b)
41. (d)	42. (d)	43. (a)	44. (c)	45. (a)	46. (d)	47. (c)	48. (b)	49. (c)	50. (b)
51. (a)	52. (b)	53. (b)	54. (a)	55. (b)	56. (b)	57. (a)	58. (a)	59. (a)	60. (c)

Biology

1. (c)	2. (d)	3. (b)	4. (a)	5. (a)	6. (b)	7. (b)	8. (a)	9. (b)	10. (d)
11. (a)	12. (c)	13. (c)	14. (a)	15. (d)	16. (c)	17. (a)	18. (c)	19. (c)	20. (a)
21. (d)	22. (a)	23. (b)	24. (c)	25. (d)	26. (c)	27. (d)	28. (c)	29. (d)	30. (b)
31. (b)	32. (b)	33. (b)	34. (c)	35. (a)	36. (c)	37. (b)	38. (d)	39. (a)	40. (a)
41. (a)	42. (a)	43. (a)	44. (d)	45. (d)	46. (d)	47. (d)	48. (a)	49. (b)	50. (c)
51. (d)	52. (a)	53. (a)	54. (a)	55. (d)	56. (b)	57. (d)	58. (b)	59. (b)	60. (a)
61. (b)	62. (a)	63. (d)	64. (d)	65. (b)	66. (c)	67. (c)	68. (d)	69. (d)	70. (a)
71. (b)	72. (b)	73. (b)	74. (b)	75. (b)	76. (a)	77. (a)	78. (c)	79. (b)	80. (a)

English

1. (d)	2. (c)	3. (d)	4. (c)	5. (d)	6. (d)	7. (d)	8. (c)	9. (d)	10. (b)
11. (c)	12. (b)	13. (d)	14. (b)	15. (c)	16. (b)	17. (d)	18. (c)	19. (c)	20. (b)
21. (a)	22. (c)	23. (b)	24. (c)	25. (a)	26. (c)	27. (a)	28. (b)	29. (d)	30. (b)
31. (d)	32. (c)	33. (a)	34. (a)	35. (c)	36. (a)	37. (a)	38. (b)	39. (a)	40. (a)

Hints & Solutions

Physics

1. For coincidence of bands

$$\frac{nD\lambda_1}{d} = \frac{(n+1)D\lambda_2}{d}$$

or $n\lambda_1 = (n+1)\lambda_2$

$7800n = 5200\,(n+1)$

or $n = 2$

2. Hubble's law states that the redshift in light coming from distant galaxies is proportional to their distance from the earth

$v = Hd$

where H Hubble's constant.

$$\therefore \text{Dimension of } H = \frac{\text{Dimension of } v}{\text{Dimension of } d}$$

$$= \frac{[LT]^{-1}}{[L]} = [T^{-1}]$$

3. From Archimedes' principle

Weight of (boy + log)

= weight of water displaced

$(60 + V \times 0.6 \times 10^3)g = V \times 10^3$ g

$\Rightarrow \quad 0.4 \times 10^3\, V = 60$

$$\Rightarrow \quad V = \frac{60}{0.4 \times 10^3} = \frac{60}{400} = \frac{3}{20}\ \text{m}^3$$

5. When an atom comes down from some higher energy level to the second energy level ($n_1 = 2$) and $n_2 = 3, 4, 5, \ldots$), then the lines of the spectrum are obtained in the visible part.

$$\frac{1}{\lambda} = R\left(\frac{1}{2^2} - \frac{1}{n^2}\right), \text{ where } n = 3, 4, 5, \ldots$$

The shortest wavelength of the series corresponds to $n = \infty$ is 3646 Å.

6. From lens formula

$$\frac{1}{f} = (\mu - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

If focal length of lens in air is f_a and in liquid is f_l, then

$$\frac{1}{f_a} = ({}_a\mu_g - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$$\frac{1}{f_e} = ({}_l\mu_g - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$$\frac{f_l}{f_a} = \frac{({}_a\mu_g - 1)}{({}_l\mu_g - 1)}$$

$$\frac{f_l}{20} = \left[\frac{\frac{3}{2} - 1}{\frac{4}{3} - 1}\right]$$

$$= \frac{3}{2}$$

$f_l = 30$ cm

7. At law pressure and high temperature real gases behaves like ideal gases.

8. Kinetic energy of satellite, $\text{KE} = \frac{1}{2}mv^2$

where $v = \sqrt{\frac{GM}{r}}$

Potential energy of satellite,

$$\text{PE} = \frac{-GMm}{r} = -mv^2$$

$\therefore$ Total energy = KE + PE

$$= \frac{1}{2}mv^2 - mv^2 = -\frac{1}{2}mv^2$$

9. When the intermolecular distance decreases due to compressive force, there is repulsive force between molecules.

10. $F = \frac{mv^2}{r}$

$$F = \frac{0.5 \times 4 \times 4}{0.4}$$

11. Magnetic domains are oriented randomly in the unmagnetised state.

12. $g = \frac{Gm}{R^2}$

$\therefore \quad g \propto \frac{1}{R^2}$

increase in value of g

$= 2$ (% decrease in R)

$= 2 \times 1 = 2\%$

13. $k \propto \frac{1}{l}$

Since, one-fourth length is cut away. So remaining length is $\frac{3}{4}$ th, hence k become $\frac{4}{3}$ times *ie*, $k' = \frac{4}{3}k$.

14. Maximum acceleration

$$\alpha = \omega^2 y$$

$\therefore \quad 0.5 = \omega^2 \times 0.02$

or $\quad \omega^2 = \frac{0.5}{0.02} = 25$

So, $\quad \omega = 5$

Now, maximum velocity is

$$v = a\omega = 0.1 \times 5 = 0.5 \text{ m/s}$$

15. Young's modulus of elasticity

$$Y = \frac{FL}{Al}$$

To double the length $l = L$

$\therefore \quad Y = \frac{F}{A} \Rightarrow F = YA$

$= 2 \times 10^{11} \times 0.1 \times 10^{-4} = 2 \times 10^6 \text{N}$

16. Cohesive force is the intermolecular attraction between like molecules, whereas adhesive force is the intermolecular force between unlike molecules. In the given case cohesive force between mercury molecules is more than adhesive force between mercury molecules and glass rod, hence mercury does not stick to rod.

17. Gas molecules collides with walls of vessels due to which there occurs change in momentum of molecules due to which force is produced and thus pressure.

$dW = pdV$

$\therefore \quad dW = p(V_2 - V_1)$

$= p\left(\frac{V}{2} - V\right) \quad \left(\because V_1 = V, V_2 = \frac{V}{2}\right)$

$= -\frac{pV}{2}$

So, the work done by the gas is negative.

20. When X-ray passed through an absorption plate of thickness d, then transmitted intensity

$$I = I_0 e^{-\mu d}$$

21. Here $C = 2\ \mu\text{F}$, $V = 100$ volt

Heat produced $H = \frac{1}{2}CV^2$

$= \frac{1}{2}(2 \times 10^{-6}) \times (100)^2$

$= 1 \times 10^{-2}$ J

$= 0.01$ J

22. Gauss is the unit of magnetic flux ϕ.

23. According to equation of motion, distance covered in nth sec.

$$S_n = u = \frac{a}{2}(2n - 1)$$

$$S_n = \frac{a}{2}(2n - 1)$$

$\therefore \quad S_1 : S_2 : S_3$

$= \{2(1) - 1\} : \{2(2) - 1\} : \{2(3) - 1\}$

$= 1 : 3 : 5$

24. $p^2 = 2mK$

$$K = \frac{p^2}{2m}$$

As given momentum p is same for both bodies

$$\frac{K_1}{K_2} = \frac{m_2}{m_1} = \frac{2m}{m}$$

$$\frac{K_1}{K_2} = \frac{2}{1}$$

25. $R \propto u^2$

$$R = ku^2$$

$$\frac{dR}{R} = 2\frac{du}{u} = 2 \times (1\%) = 2\%$$

26. Einstein explained the phenomenon of photo-electric effect on the basis of Planck's theory. According to which the kinetic energy of photoelectrons emitted from the metal surface is E and ϕ is the work function of the metal, then

$$E = h\nu - \phi \quad \ldots(i)$$

where $h\nu$ is the energy of the photon absorbed by the electron in the metal. If for a given metal, the threshold frequency of light be ν_0 then an amount of energy $h\nu_0$ of the photon of light will be spent in ejecting the electron out of the metal.

ie, $$\phi = h\nu_0 \quad \ldots(ii)$$

From Eqs. (i) and (ii), we get

$$E = h\nu - h\nu_0$$

$$\Rightarrow \quad E = h(\nu - \nu_0)$$

27. In line spectrum, bright coloured lines are observed on a dark background. These are called spectral lines. Each spectral line has a definise wavelength. Line spectrum is obtained per gases and metallic vapours, when they are in the atomic state. It means that line spectrum is related with the atomic state of matter.

28. $R = R_0\left(\frac{1}{2}\right)^n$

$$\frac{R}{R_0} = \left(\frac{1}{2}\right)^{t/T_{1/2}}$$

$$\left(\frac{1}{8}\right) = \left(\frac{1}{2}\right)^{t/T_{1/2}}$$

$$\left(\frac{1}{2}\right)^3 = \left(\frac{1}{2}\right)^{t/T_{1/2}}$$

$$\frac{t}{T_{1/2}} = 3$$

$$t = 3T_{1/2} = 3 \times 8 = 24 \text{ yr}$$

29. Approximate resistance of p-n junction in forward bias, $R_f = 10^2\ \Omega$

Approximate resistance of p-n junction in reverse bias, $R_r = 10^6\ \Omega$

$$\therefore \quad \frac{R_f}{R_r} = \frac{10^2}{10^6} = \frac{10^{-4}}{1}$$

$$\Rightarrow \quad R_f : R_r = 10^{-4} : 1$$

30. $r \propto \frac{n^2}{Z}$ and $v \propto \frac{Z}{n^2}$

Time period of revolution of an electron around the nucleus of charge Ze is

$$T = \frac{2\pi r}{v} = 2\pi \frac{n^2}{Z} \cdot \frac{n}{Z}$$

$$\Rightarrow \quad T \propto \frac{n^3}{Z^2}$$

32. Velocity of sound in air $v = 336$ m/s.

As we are quite well know that the lowest frequency of audible sound is 20 Hz. Hence maximum length of a closed pipe to produce just audible sound is given by

$$l = \frac{336}{4 \times \nu} = \frac{336}{4 \times 20}$$

$$= 4.2 \text{ m}$$

33. The phenomena of rotation of plane polarised light is called optical activity.

36. Ionization energy $= RchZ^2$

$Z = 3$ for Li^{2+}

Ionization energy $= (3)^2\ Rch$

$$= 9\ Rch$$

37. Error in radius, $\frac{\Delta r}{r} = 0.3\%$

Volume of sphere $= \frac{4}{3}\pi r^3$

$\therefore$ Error in volume $= 3 \times \frac{\Delta r}{r}$

$$= (3 \times 0.3)\% = 0.9\%$$

38. For a rectangular lamina, moment of inertia about a time passing through centre and parallel to longer side is minimum.

Hence, momentum of inertia about EG will be minimum.

39. Maximum speed $v = \sqrt{2g\ (h_2 - h_1)}$

$$= \sqrt{2 \times 10 \times (2 - 0.75)}$$

$$= \sqrt{(20 \times 1.25)}$$

$$= \sqrt{25} = 5 \text{ m/s}$$

40. Oscillator is an amplifier with positive feed back *ie,* with feedback more than unity.

41. Relation (d) which is $x = \sqrt{a - bv^2}$ correctly represent the SHM because, velocity

$$v = \omega\sqrt{a^2 - x^2}$$

or $$x = \sqrt{a^2 - v^2/\omega^2}$$

or $$x = \sqrt{a^2 - bv^2}$$

where $$b = \frac{1}{\omega^2}$$

or $\text{slope} \propto r^2$

For thinnest wire slope is minimum.

ie, wire *OA* is thinnest.

43. Time constant $= \frac{L}{R} = \frac{10}{5} = 2\,\text{s}$

ie, is 2 s, the current sizes to $\left(1 - \frac{1}{e}\right)$

or $(1 - e^{-1})$ times.

44. Semiconductor can be used safely between temperature 0°C and 75°C.

45. From first law of thermodynamics,

$$dQ = dU + dW$$

we have $dQ = dU$ (as $dW = 0$)

But $dQ < 0$

$\therefore$ $dU < 0$

$$NC_V\,\Delta T < 0$$

or $\Delta T < 0$

Hence, the temperature will decrease.

46. Refractive index of medium $n = \frac{\lambda_a}{\lambda_m}$

$$= \frac{6000}{4000} = 1.5$$

47. The prism deviates the light rays towards its base.

48. There will be no force on electron due to magnetic field (because of parallel motion), but due to force applied by electric field, velocity of electron will decrease.

49. In case of transistor, constant α is current gain in common-base configuration and constant β is current gain in common-emitter configuration. Also α is always less than 1 while β is always greater than 1.

50. $\frac{\theta_1 - \theta_2}{t} = K\left(\frac{\theta_1 + \theta_2}{2} - \theta_0\right)$

$$\therefore \frac{80° - 60°}{1} = K\left(\frac{80° + 60°}{2} - 30°\right)$$

$$20 = K \times 40 \Rightarrow K = \frac{1}{2}$$

For next 1 min

$$\frac{60° - \theta}{1} = \frac{1}{2}\left(\frac{60° + \theta}{2} - 30°\right)$$

$$\Rightarrow \theta = \frac{240}{5} = 48°\,\text{C}$$

51. Hydrogen molecule behaves as diamagnetic as no net magnetic moment is associated with it.

52. In a DC circuit $X_L = \omega L = 2\pi f L = 0$

Therefore $Z = R = 10\ \Omega$

53. Gasses cannot be liquified above critical temperature but at high pressure they can be.

54. For meter bridge

Unknown resistance

$$R = \frac{l_2}{l_1} \times X = \frac{3}{2} \times 5 = 7.5\ \Omega$$

55. Fringe width, $\beta = \frac{D\lambda}{d}$

But here, $\theta = \frac{d}{D} \Rightarrow d = D\theta$

$\therefore$ $\beta = \frac{D\lambda}{D\theta} = \frac{\lambda}{\theta}$

56. Mean kinetic energy of gas depends only on the temperature. Here temperature is given same, so ratio of kinetic energies will be 1 : 1.

57. Phase difference in *R-L* circuit

$$\phi = \tan^{-1}\left(\frac{X_L}{R}\right)$$

$$\tan 45° = \frac{X_L}{R}$$

$$X_L = R$$

58. The wire does not sink, so net force on it will be zero

$\therefore$ $mg = T \cdot 2l$

$\Rightarrow$ $\pi r^2 l d g = T \cdot 2l$

$\therefore$ $r = \sqrt{\frac{2T}{\pi d\, g}}$

59. Musical interval produced between two notes of frequencies is given by

$$\frac{320}{240} = 1.33$$

60. Tension, $T = mg$ – buoyant force

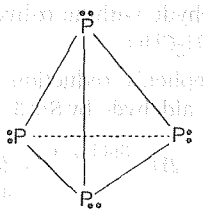
$$= V\rho g - V\sigma g = V(\rho - \sigma)\,g = l^3\,(\rho - \sigma)\,g$$

$$= 8 \times 10^{-6}\,(8920 - 820) \times 10$$

$$= 0.648\ \text{N}$$

Chemistry

1. Polarity character is due to the difference in electronegativities of two atoms or molecules.
2. PF_5 involves sp^3d hybridisation and hence has trigonal bipyramidal structure.
3. Tetrahedral sites are double comparable to octahedral sites therefore ratio of X and Z is 2 : 1, hence formula of the compound should be X_2Z.
4. At $A \rightarrow$ temperature = 300 K, volume = 10 L, pressure = p_1
   At $C \rightarrow$ temperature = 600 K
   Volume = 20 L, Pressure = p_2
   From $\frac{p_1V_1}{T_1} = \frac{p_2V_2}{T_2}$
   $$\frac{p_1 \times 10}{300} = \frac{p_2 \times 20}{600}$$
   or $p_1 = p_2$
   i. e., process is isobaric.
5. During evaporation, molecules having high energy leave the surface of liquid. As a result average kinetic energy of liquid decreases.
   $KE \propto T$
   ∴Temperature of liquid falls.
6. $\Delta E = Q + W = 600 + (-300) = 300$ J
7. $C(s) + O_2(g) \longrightarrow CO_2(g)$
   $\Delta H = -393.5\ kJmol^{-1}$
   $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$
   $\Delta H = -283\ kJmol^{-1}$
   On subtracting equation (ii) from equation (i), we get
   $C(s) + O_2(g) \rightarrow CO(g)$; $\Delta H = -110.5\ kJmol^{-1}$
   The enthalpy of formation of carbon monoxide per mole = $-110.5\ kJmol^{-1}$
8. K_c is a characteristic constant for the given reaction.
9. For first order reaction, $t_{1/2}$ is independent of initial concentration.
10. $H_2O + NH_3 \rightleftharpoons NH_4^+ + OH^-$
    In this reaction H_2O acts as acid because it donate a proton.
11. $CH_3COOH \rightleftharpoons CH_3COO^- + H^+$
    On adding CH_3COONa, due to common ion, $[H^+]$ decreases.
12. $X^- + H_2O \rightleftharpoons HX + OH^-$
    $$K_h = \frac{10^{-14}}{10^{-5}}$$
    So, degree of hydrolysis
    $$x = \sqrt{\frac{K_h}{C}} = \sqrt{\frac{10^{-9}}{10^{-1}}} = 10^{-4}$$
    % degree of hydrolysis = $10^{-4} \times 100 = 0.01\%$
13. Electron affinity value of Cl is higher than that of F as Cl belongs to 3rd period while F belongs to 2nd period. In Cl, electron-electron repulsion forces are weaker than that of F.
14. IE of Na, Mg, Al and Si are in the order
    Na < Al < Mg < Si
15. NaCN is used as a depressant in the separation and concentration of ZnS and PbS ore. Here, NaCN acts as a depressant for ZnS but does not prevent PbS from forming the froth.
16. Malachite $[CuCO_3 \cdot Cu(OH)_2]$ is an ore of copper.
17. P_4 molecule,
    Bond angle = 60°
    Six P—P = single bonds
    Lone pair = 4

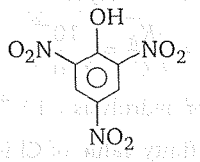


18. Xe is highly polar since the ionisation potential of xenon is quite close to the ionisation of oxygen.
19. Due to free electron, liquid ammonia becomes paramagnetic.
20. Ionic radii $\propto \frac{1}{\text{atomic number}}$, ionic radius decreases from left to right in a period.
21. Basic character of oxide decreases from left to right in a period of Preriodic Table.
22. 22 carat gold is an alloy of copper and gold.

Sc^{3+} $3s^2$ $3p^6$ $3d^0$

No unpaired electron so, will show diamagnetic character so will weights less when, weighted in magnetic field.

24. 2, 4, 6-trinitrophenol is called picric acid.



25. Lucas reagent is used for distinction between primary, secondary and tertiary alcohols. Tertiary alcohol gives turbidity immediately with Lucas reagent. 2-hydroxy-2-methyl propane is a tertiary alcohol.

26. $CH_3CH(H)=O \xrightarrow{HCN} CH_3C(H)(OH)CN \xrightarrow{H_3O^+} CH_3C(H)(OH)COOH$

lactic acid

27. Compound $A + NaOH \longrightarrow$ alcohol + acid.

Hence, it is cannizzaro's reaction and A should be an aldehyde without α-hydrogen atom *e. g.*, HCHO, C_6H_5CHO.

28. In the Stephen's reduction alkyl cyanide is reduced to aldehyde by $SnCl_2$/ HCl.

$$R{-}C{\equiv}N + 2H \xrightarrow{SnCl_2/HCl} \underset{\text{alidime hydrochloride}}{RCH{=}NH\cdot HCl} \xrightarrow{H_2O} \underset{\text{aldehyde}}{RCHO} + NH_4Cl$$

29. Cuprammonium salt is $[Cu(NH_3)_4]SO_4$. In water it gives two ions, $[Cu(NH_3)_4]^{2+}$ and SO_4^{2-}.

30. Potash alum is an example of double salt.

31. Metal carbonyl organometallic compounds possess both σ and π characters.

32. Formic acid has —C—H (aldehyde) group. It reduces Tollen's reagent to silver mirror like other aldehydes.

33. $CH_3CONH_2 + HNO_2 \longrightarrow CH_3COOH + H_2O + N_2\uparrow$

34. $CaC_2 + 2H_2O \longrightarrow \underset{(A)}{C_2H_2} + Ca(OH)_2$

$$\begin{matrix}CH\\|||\\CH\end{matrix} \xrightarrow{Dil.H_2SO_4/HgSO_4} \begin{matrix}CH_2\\||\\CHOH\end{matrix} \longrightarrow \underset{\substack{(B)\\\text{acetaldehyde}}}{CH_3CHO}$$

35. Isobutene, $CH_3-\overset{CH_3}{\overset{|}{C}}=CH_2$ has minimum force of attraction due to steric hindrance hence, it has minimum boiling point.

36. The C—X bond energy is maximum in CH_3F hence, fluoride is less reactive to form the Grignard reagent with Mg.

37. In alkaline hydrolysis of a tertiary halide by aqueous alkali, if concentration of alkali is doubled, then the reaction will remain constant because t-alkyl halides with aqueous alkali give S_N1 reaction and rate of S_N1 reaction is not based upon the concentration of nucleophile (*i. e.*, alkali).

38. Amino acids are bifunctional organic compounds, hence it contains both carboxylic group (—COOH) as well as amino group ($-NH_2$).

39. Glucose and manose are isomers, differ in configuration at C_2. Isomers which are differ at C_2 position are known as epimers.

40. Dettol is a mixture of chloroxylenol and terpeneol in a suitable solvent.

41. $C_6H_5NO_2 + 4H \xrightarrow{Zn + NH_4Cl} C_6H_5NHOH + H_2O$

nitrobenzene — phenyl hydroxylamine

42. Due to resonance of electron pair in aniline, basic strength decreases while in benzylamine, electron pair do not involve in resonance hence, its basic strength is highest.

43. $C_6H_5NH_2 + CH_3COCl \xrightarrow[-HCl]{NaOH} \underset{\text{acetanilide}}{C_6H_5NHCOCH_3} + HCl$

44. $\underset{0.1596\,g}{A_2O_3} + \underset{0.006\,g}{3H_2} \longrightarrow 2A + 3H_2O$

0.006 g of H_2 reduces 0.1596 g of A_2O_3

6 g of H_2 will reduces

$$= \frac{0.01596 \times 6}{0.006} = 159.6\,g\ A_2O_3$$

Hence, molecular weight of $A_2O_3 = 159.6$ g

Let molecular weight of $A = x$

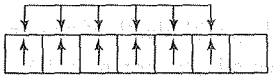
$\therefore \quad 2x \times 3 \times 16 = 159.6$

or $\quad 2x = 159.6 - 48$

or $\quad 2x = 111.6$

or $\quad x = 55.8$

45. As electron moves away from the nucleus, its potential energy increases.

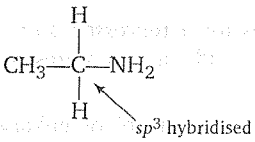
46. 

f^6

No of exchanges $= 5 + 4 + 3 + 2 + 1 = 15$

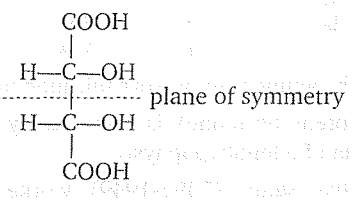
47. Oxidation state of P in H_3PO_4

$$+3 + x - 8 = 0$$
$$x - 5 = 0$$
$$x = +5$$

48. 

49. Acetaldehyde, CH_3CHO is the rearrangement product of vinyl alcohol, $CH_2{=}CHOH$.

50. Allyl chloride show formation of very stable $CH_2{=}CH-\overset{+}{C}H_2$ ion and rest two have partial double bond character in their C—*X* bond.

51. 

Meso tartaric acid is optically inactive due to the presence of molecular symmetry. It is optically inactive due to internal compensation *i. e.*, the effect of one half of the molecule is neutralised by other.

52. IUPAC name of $CH_3OC_2H_5$ is methoxy ethane.

53. $CH_3—\underset{\displaystyle Br}{\underset{|}{CH}}—CH_2—CH_3$

$$\xrightarrow{\text{Alco. KOH}} \begin{cases} CH_3CH{=}CH—CH_3 & \text{(major)} \\ CH_2{=}CH—CH_2CH_3 & \text{(minor)} \end{cases}$$

This reaction is governed by Saytzeff's rule. According to this rule, the elimination of β-hydrogen atom take place from the carbon having the less number of H-atoms or in other words, a stable alkene is formed (More substituted alkene is more stable)

54. Raoult's law is not applicable if the total number of particles of solute changes in the solution due to association or dissociation.

55. For NaCl, $i = 2$

$$\Delta T_f = 2K_f m = 2 \times 1.86 \times 1 = 3.72$$
$$T_s = T - \Delta T_f = 0 - 3.72 = -3.72°C$$

56. $W_{metal} = \frac{Eit}{96500} = \frac{E \times 3 \times 50 \times 60}{96500}$

$$E = \frac{96500 \times W}{3 \times 50 \times 60}$$
$$= \frac{96500 \times 1.8}{3 \times 50 \times 60} = 19.3$$

57. $E_{cell} = E^\circ_{cell} - \frac{0.059}{2} \log \frac{[Zn^{2+}]}{[Cu^{2+}]}$

$$= 1.10 - \frac{0.059}{2} \log \frac{0.1}{0.1}$$
$$= 1.10\ V$$

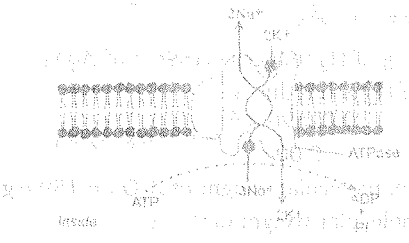
58. Purple of cassius is a colloidal solution of gold (Au).

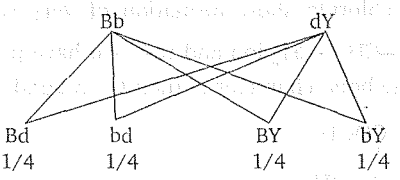
59. Amount of substance adsorbed should increase with decrease in temperature.

60. In Fe_3O_4, let oxidation number of Fe = x

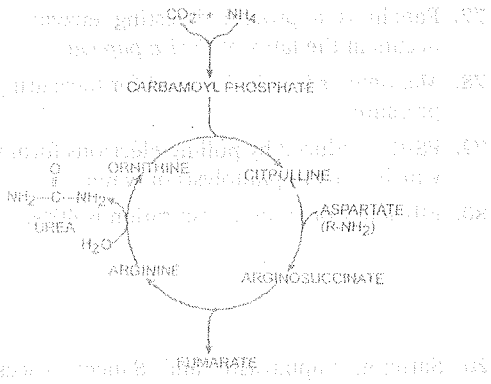
$$3x + 4(-2) = 0 \text{ or } x = \frac{8}{3}$$

1. Louis Pasteur made this statement with reference to serendipity, discoveries by accident and sagacity.
2. Agar agar is used in preparing culture media to grow bacteria and other microorganisms. It is obtained from red algae such as *Gracilaria* and *Gelidium*. The clear transparent areas develop as bacteria are feeded by bacteriophages.
3. Species is a product of group of interbreeding organisms.
4. Most of the broad spectrum antibiotics like streptomycin, erythromycin, chloromycin, tetracycline, aureomycin, etc, are obtained from different species of *Streptomyces* which belong to Actinomycetes.
5. Plasmids of some bacterial cells have been used as vector for carrying foreign genes for genetic engineering and biotechnological experiments. Cyanophycean forms have not been used for these experiments.
6. Quinine is a white, bitter, crystalline alkaloid extracted from the bark of *Cinchona*, used in antimalarial medication.
7. *Ephedra* is a xerophyte. Its leaves are highly reduced and scaly. The whole plant is used for extraction of ephedrine alkaloid.
8. Tornaria is the larva of *Balanoglossus* which belongs to the sub-phylum–Hemichordata.
9. Metabolism occurs in all living organisms.
10. Complete metamorphosis occurs in the insects belonging to the division–Endopterygota or Holometabola.
11. Horse (*Equus*) is an unguligrade animal running on one digit. The feet are most specialized, with only one digit (third), walton the hoof that covers the end of toe.
12. Janus green B is used for vital staining of mitochondria which contain cytochrome oxidase, an enzyme concerned with cellular respiration.
13. Virus lacks the typical structure of a cell.
14. Energy from ATP cause confermational change in the solute carrier complex. From energy of one ATP, $3Na^+$ pumped outside and two K^+ taken in. This process of expelling out Na^+ ions and drawing in K^+ ions against the concentration gradient and electrochemical gradient is called sodium-protassium exchange pump of the cell.



15. Haematin is a brown ferric iron containing substance obtained from oxyhaemoglobin or from dried blood.
16. Omnivores feed on all types of foods, hence contain maximum number of digestive enzymes.
17. Lethal means dealing with death of bearer.
18. Balbiani rings have a high content of RNA and show a rapid uptake and turnover of RNA precursors in polytene chromosomes.
19. In the double helical model of DNA proposed by Watson and Crick, the nitrogenous bases attached to the pentose sugar moity.
20. Retroviruses are exception to the central dogma.
21. Regular gene codes for a repressor protein in inducible system and a co-repressor in repressible system.
22. RNA synthesized in the nuclei of eukaryotes comprises heterogenous nuclear RNA (*hn*-RNA). This includes primary messenger RNA.
23. 

24. Because the amino acids are organic monomers.
25. MSH (protein hormone) is secreted by pars intermedia of adenohypophysis.
26. Prof. Birbal Sahni (1891-1949) worked on class–Pentoxylae, gymnosperms of Jurassic period from Nipania Chert in Raj Mahal hills of Bihar.

27. In apes, arms are longer than legs. This helps in a form to locomotion called brachiation, a type of suspension and swinging of the body.
28. *Orobanche* is total root parasite of crucifers and thus found growing in mustard field at the time of harvesting of crop (March).
29. Coconut fruit develops fibrous mesocarp which provide buoyancy to fruit and help in its dispersal through water. Coconut trees usually grow in water logged saline sea shore areas.
30. Outermost layer of bark is the layer of cork or phellem produced by phellogen or cork cambium to protect vital tissues from drought and dessication.
31. Water potential decreases with addition of solute. Water potential of a cell protoplasm is equal but opposite in sign to DPD.
32. Urea is synthesized in liver through ornithine cycle, which was discovered by **Hans Krebs** and **Kurt Henseliet** (1933).
33. 

Ruben and Kamen (1941) states that O_2 evolved during photosynthesis comes from water and not CO_2.
34. As respiratory substrate $C_{39}H_{72}O_6$ is poorer in oxygen as compared to C and H. Hence, more O_2 will be required to oxidise it. So, value of R.Q. will be less than one (0.718).
35. Cartilage is semisolid and flexible fibrous connective tissue of skeletal tissue. Blood is the softest tissue in the body. Areolar tissue connects and supports other tissues. Serous glands secrete water fluid, *e.g.*, sweat glands, parotid glands.
36. Liver is endodermal in origin.
37. Corpus luteum, an endocrine structure is formed in the mammalian ovary from ruptured Graafian follicle after ovulation.
38. Amylopsin is another name for pancreatic amylase which digesting starch in alkaline medium.
39. Respiratory centre in medulla is affected by the chemical nature of arterial blood especially p_{CO_2} or blood pH.
40. Because urea in removed from blood in kidney.
41. Polyuria occurs when excess of urine is produced. In pyuria, WBCs or pus in urine are present. Gont is a condition of high level of uric acid in blood. Haematuria occurs when RBCs are present in urine.
42. Brush border indicates the presence of microvilli.
43. Radius of the lower arm is a cartilaginous bone.
44. Rigor Mortis occurs due to skeletal and cardiae muscles shortly after death.
45. Acetylcholine is a neurotransmitter with a primary function of mediating synaptic activity of the nervous system.
46. The auditory area is located in the temporal lobe of cerebrum.
47. Adrenaline increases heart rate as well as cardiac output. This promotes increase of blood pressure.
48. In pollen culture, anthers are used as nurse cells for successful production of embryoids.
49. Ethylene is a gaseous plant hormone that controls many activities in plants.
50. Root meristem (showing high cell division) is sub-apical in position due to presence of root cap.
51. The central follicular cavity or antrum is lined by membrane granulosa.
52. Foetus is the unborn offspring of a viviparous animal after it has attained the particular form of the species.
53. The pronephros or head kidney derived from the anterior nephrostome are functional in frog's tadpole.
54. Growth hormone of pituitary can work effectively only in the presence of thyroxine.
55. Helical contractile sheath is found around the tail of bacteriophage.

algae).

58. Mycoplasma is obligate parasite and thus it divides and redivides only inside the body of living host.
59. It is believed to cause pyorrhoea. Which spread by kissing.
60. Gills of *Agaricus* produces hymenium layer to develop basidia and basidiospores for reproduction.
61. Number of microsporangia in monothecous anthers is only two while in dithecous anthers, four.
62. Terpentine oil is a liquid resin obtained from *Pinus*.
63. Most cells diameter are in the unit µm.
64. It is the most important genus of Gram positive bacterium with many species of great medical importance.
65. The 'rope like arrangement of microtubules intermediate filaments is well suited for providing mechanical stability to the cell.
66. The cells which are metabolically active contain mitochondria in abundance.
67. Among leucocytes, neutrophils and monocytes are phagocytic.
69. Crossing over or recombination of genes results in variations.
70. Ovum or sperm of human beings contains equal number of autosomes, *ie,* 22 each.
71. DNAse breaks DNA into nucleotides.
72. Puromycin is a structural analogue of the aminoacyl end of the *t*RNA. It reversibly reacts with the peptidyl *t*RNA, thereby terminating protein synthesis.
73. A loreal pit between the eye and nostril is found in pit vipers like *Ancistrodon* and *Crotalus* (rattle snake) of North America.
74. Mammary glands are present in all mammals.
75. Irregular flowers are isobilaterally symmetrical.
76. Funnel-shaped style and stigma of *Crocus sativus* are used as saffron.
77. Papain is a protein digesting enzyme which occurs in the latex of *Carica papaya*.
78. Manometer is a device used for measuring root pressure.
79. PS-II is reduced by pulling electrons form water which leads to photolysis of water.
80. Efficiency of aerobic respiration is 40%.

English

21. Second is the sound made by the first.
22. Second is used to make the first.
23. Second feeds on the first.
24. As, light rays falling on mirror undergo reflection. Similarly, light rays falling on water undergo refraction.
25. As, 'Tennis' is played on 'Court'. Similarly, 'Boxing' is played on 'Ring'.
26. Sarnath, Kapilavastu and Sanchi places are linked with Lord Buddha.
27. Ebony, Rosewood and Mahogany are hardwood trees.
28. Arjun, Uddhav and Sudama all were friends of Krishna.
29. Sherlock Holmes, James Bond and Hercules Poirot, all are characters from detective fiction.
30. Goose, Duck and Stork, all are water birds.