

PHYSICS

1. The dimensions for $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$ are same as

a. Acceleration b. Velocity
c. Time d. Energy

1. b

$\frac{1}{\sqrt{\mu_0 \epsilon_0}}$ is the speed of electromagnetic wave in vacuum from Maxwell's theory

2. Which set of forces acting on a body can never produce zero acceleration?

a. 10N, 10N, 20N b. 6N, 8N, 20N
c. 1N, 2N, 3N d. 7N, 12N, 20N

2. d

To produce zero resultant, the sum of magnitudes of two smaller forces should be smaller than the third (largest) vector.

a. $10 + 10 = 20$ (equal) b. $6 + 8 = 14 > 10N$
c. $1 + 2 = 3$ (equal) d. $7 + 12 = 19 < 20N$

3. The equation of a sound wave is $y = 0.0015 \sin(62.4x + 316t)$. The wavelength of the wave is:

a. 0.2 unit b. 0.1 unit
c. 0.3 unit d. Cannot be calculated

3. b

Comparing with $y = a \sin 2\pi \left[\frac{x}{\lambda} + \frac{t}{T} \right]$

we get $\frac{2\pi}{\lambda} = 62.4$

or, $\lambda = \frac{2\pi}{62.4} = 0.1$ unit

4. A closed organ pipe and an open organ pipe have their first overtone identical in frequency. Their lengths are in the ratio of:

a. 1:1 b. 1:2
c. 2:1 d. 3:4

4. d

First overtone of closed pipe $= 3 \left(\frac{v}{4l_1} \right)$

First overtone of open pipe $= 2 \left(\frac{v}{3l_2} \right)$

$$\Rightarrow 3 \left(\frac{v}{4l_1} \right) = 2 \left(\frac{v}{3l_2} \right)$$

$$\therefore \frac{l_1}{l_2} = \frac{3}{4}$$

5. The musical interval between the two notes of frequencies 240 Hz and 320 Hz is

a. $\frac{3}{4}$ b. $\frac{4}{3}$
c. 40 Hz d. 80 Hz

5. b

$$\text{Musical interval} = \frac{320}{240} = \frac{4}{3}$$

6. In a double slit experiment, the fringe width will be maximum for:

a. Violet b. Red
c. Green d. Yellow

6. b

$$\beta \propto \lambda$$

As wavelength of red is the longest, the fringe width of the red light will be maximum.

7. A metallic wire is stretched by 0.1% of its initial length. The longitudinal strain in the stretched wire will be:

a. 10^{-4} b. 10^{-3}
c. 10^{-2} d. 10^{-1}

7. b

$$\text{Longitudinal strain} = \frac{\Delta l}{l} = \frac{0.1}{100} = 10^{-3}$$

8. A capillary tube of radius r can support a liquid of weight $6.28 \times 10^{-4} \text{ N}$. If the surface tension of the liquid is $5 \times 10^{-2} \text{ N/m}$. The radius of the capillary must be:

a. $2.5 \times 10^{-4} \text{ m}$ b. $1.5 \times 10^{-3} \text{ m}$
c. $2 \times 10^{-4} \text{ m}$ d. $2 \times 10^{-3} \text{ m}$

8. d

Force of surface tension acting upward = weight balanced

$$\text{or, } 2\pi r T \cos \theta = mg = 6.28 \times 10^{-4}$$

$$\text{or, } 2\pi r \times 5 \times 10^{-2} \times 1 = 6.28 \times 10^{-4}$$

$$\square r = 2 \times 10^{-3} \text{ m}$$

9. At what depth, the value of 'g' is same to that of 'g' at a height 10 km?

a. 20 km b. 10 km
c. 40 km d. 80 km

9. (a)

From question,

$$g_h = g_d$$

$$\text{or, } g \left(1 - \frac{2h}{R} \right) = g \left(1 - \frac{d}{R} \right)$$

$$\square d = 2h$$

$$= 2 \times 10 \text{ km} = 20 \text{ km}$$

- At the centre of earth, g is zero.

10. Unit of coefficient of viscosity is

a. $\text{N}/(\text{m}^2 \text{s}^{-1})$ b. $\text{Nm}^2 \text{s}^{-1}$
c. Nm^2/s d. Nm^2/s^2

10. (a)

- Coefficient of viscosity is evaluated by,

$$F = -\eta A \frac{dv}{dx}$$

Where F is viscous force, η is the coefficient of viscosity, A is the Area of cross-section of unit m^2

and $\frac{dv}{dx}$ is velocity gradient of unit s^{-1} .

So,

For unit of η

$$N = \eta \times \text{m}^2 \times \text{s}^{-1}$$

$$\eta = \frac{N}{\text{m}^2 \text{s}^{-1}} = \text{N}/(\text{m}^2 \text{s}^{-1})$$

11. A balloon of weight 300N is moving upward. Volume of balloon is 30 m^3 and displacing air of density 1.2 kg/m^3 . Then the force that carries the balloon upward is:

a. 360N b. 60N
c. 230N d. 400N

11. (b)

- Upthrust on balloon (U) = $V\rho g$
 $= 30 \times 1.2 \times 10$
 $= 360 \text{ N}$

Weight of ballon (W) = 300N

Then,

Force carrying ballon upward is = U - W
= (360-300) N
= 60N

- 12. The relation of escape velocity with orbital velocity is given by**

a. $v_e = v_o$ b. $v_e = 2v_o$
c. $v_e = \frac{1}{\sqrt{2}} v_o$ d. $v_e = \sqrt{2} v_o$

12. d

$$v_e = \sqrt{2gr} \quad v_o = \sqrt{gR}$$

$$v_e = \sqrt{2} v_o$$

- 13. The X-ray tube is operated at 50kV. The minimum wavelength is approx:**

a. 0.5 Å b. 0.25 Å
c. 10 Å d. None

13. b

We have,

$$\lambda_{\min} = \frac{12400}{v} = \frac{12400}{50000} = 0.25 \text{ Å}$$

- 14. The moment of inertia of a solid sphere of mass M and radius R about its diameter is**

a. $\frac{2}{3} MR^2$ b. $\frac{2}{5} MR^2$
c. $\frac{3}{5} MR^2$ d. $\frac{7}{5} MR^2$

14. b

M.I of sphere through C.G perpendicular to plane
= M.I through diameter = $\frac{2}{5} MR^2$

- 15. Air is expanded from 50 litres to 150 litres at 2 atmospheric pressure. The external work done is:**

a. $2 \times 10^4 \text{ J}$ b. 2000 J
c. 200 J d. $2 \times 10^{-8} \text{ J}$

15. a

$$W = P(V_2 - V_1)$$

$$= 2 \times 10^5 (150 - 50) \times 10^{-3} \text{ J}$$

$$= 2 \times 10^4 \text{ J}$$

- 16. A charged particle of charge $2\mu\text{C}$ experiences a force of 0.02N, what is the magnitude of electric field?**

a. 10^4 N/C b. 0.04 N/C
c. 0.01 N/C d. 10^8 N/C

16. a

$$E = \frac{F}{q_0} = \frac{0.02}{2 \times 10^{-6}} = 10^4 \text{ N/C}$$

- 17. Bending of tap water towards the rod is due to:**

a. Magnetic field b. Electrodynamic charge
c. Electrostatic charge d. Doesn't bend

17. (c)

Water, which is two hydrogen atoms & one oxygen atom, is made up of charged particles, with the two hydrogen atoms having positive charge. Because in liquid form of water, these atoms are free to move around any which direction, it can easily be affected by a static electrical charge.

- 18. A capacitor of capacitance $\frac{1}{\pi} \mu\text{F}$ is connected in an alternating circuit of frequency 50 Hz. The capacitive reactance is**

a. 100Ω b. 50Ω
c. $\frac{1}{100} \Omega$ d. $10^4 \Omega$

18. d

$$X_C = \frac{1}{\omega C} = \frac{1}{2\pi f C} = \frac{1}{2\pi \times 50 \times \left(\frac{10^{-6}}{\pi}\right)}$$

$$= 10^4 \Omega$$

- 19. The half life of a radioactive substance is 30 days. The time taken for $\frac{3}{4}$ of original mass to disintegrate is:**

a. 15 days b. 30 days
c. 45 days d. 60 days

19. d

$$\text{Undisintegrated part} = 1 - \frac{3}{4} = \frac{1}{4}$$

$$\therefore \frac{m}{m_0} = \left(\frac{1}{2}\right)^n = \frac{1}{4}$$

$$\Rightarrow \left(\frac{1}{2}\right)^n = \left(\frac{1}{2}\right)^2 \therefore n = 2$$

$$\therefore \text{Time taken for 2 half life} = n \times \frac{T_{1/2}}{2}$$

$$= 2 \times 30$$

$$= 60 \text{ days}$$

- 20. The energy liberated in a nuclear fission of 1 kg of uranium is:**

a. 2×10^{23} joules b. 9×10^{16} joules
c. 8×10^{14} joules d. 9×10^{20} joules

20. b

$$E = 10^{16} \text{ N/m}^2$$

$$= 1 \times (3 \times 10^8)^2 \text{ Joule} = 9 \times 10^{16} \text{ Joule}$$

- 21. At what angle should the two vectors $2F$ and $\sqrt{2} F$ act, so that the resultant force is $F\sqrt{10}$?**

a. 120° b. 90°
c. 60° d. 45°

21. d

$$F_R = \sqrt{F_1^2 + F_2^2 + 2F_1F_2\cos\theta}$$

$$F_1 = 2F, F_2 = \sqrt{2}F, F_R = F\sqrt{10}$$

$$F\sqrt{10} = \sqrt{(2F)^2 + (\sqrt{2}F)^2 + 2(2F)(\sqrt{2}F)\cos\theta}$$

Squaring,

$$10 F^2 = 4F^2 + 2F^2 + 4\sqrt{2}F^2\cos\theta$$

$$\cos\theta = \frac{10F^2 - 6F^2}{4\sqrt{2}F^2} = \frac{1}{\sqrt{2}}$$

$$\Rightarrow \theta = 45^\circ$$

- 22. Which of the following does not change when a projectile is fired at an angle with the horizontal?**

a. Momentum
b. Kinetic energy
c. Vertical component of velocity
d. Horizontal component of velocity

22. d

In projectile motion, the horizontal component of velocity remains constant throughout the entire motion.

23. A beam of sound is 10^6 times as intense as that with minimum audible intensity. The intensity level of the beam is:

a. 10^6 dB b. 6 dB
c. 60 dB d. 0.6 dB

23. c

$$\text{Intensity level} = 10 \log \left(\frac{I}{I_0} \right) = 10 \log 10^6 = 60 \text{ dB}$$

24. In Celsius temperature scale, the absolute zero of temperature is at:

a. 0°C b. -32°C
c. 100°C d. -273.15°C

24. d

25. A constant volume gas thermometer shows pressure reading of 50 cm and 90 cm of mercury at 0°C and 100°C respectively. When the pressure reading is 60 cm, the temperature becomes:

a. 25°C b. 40°C
c. 15°C d. 12.5°

25. b

$$P_t = P_0(1 + \gamma t)$$

$$\text{or, } P_t - P_0 = P_0 \gamma t \dots\dots\dots (1)$$

$$\text{and } P_{100} - P_0 = P_0 \gamma 100 \dots\dots (2)$$

$$\square \frac{P_t - P_0}{P_{100} - P_0} = \frac{t}{100} \Rightarrow t = \frac{P_t - P_0}{P_{100} - P_0} \times 100$$

$$\square t = \frac{60 - 50}{90 - 50} \times 100 = 25^\circ \text{C}$$

26. The molar specific heat at constant pressure of an ideal gas is $\left(\frac{7}{2}\right)R$. The ratio of specific heat at constant pressure to that at constant volume is:

a. $\frac{9}{7}$ b. $\frac{7}{5}$
c. $\frac{8}{7}$ d. $\frac{5}{7}$

26. b

$$C_p = \frac{5}{2} R \quad C_p - C_v = R$$

$$\frac{5}{2} R - C_v = R \Rightarrow C_v = \frac{5}{2} R$$

$$\therefore \gamma = \frac{C_p}{C_v} = \frac{(7/2)R}{(5/2)R} = \frac{7}{5}$$

27. The pressure exerted by a gas on the wall of enclosure is proportional to:

a. v_{rms} b. $\frac{1}{v_{\text{rms}}}$
c. $\sqrt{v_{\text{rms}}}$ d. v_{rms}^2

27. d

$$P = \frac{1}{3} \rho v_{\text{rms}}^2$$

28. A cube, a sphere and a circular plate made of same material and having the same mass are

heated to the same high temperature. Which one cools at the slowest rate when put in the same surrounding?

a. The sphere
b. The cube
c. The circular plate
d. The rate of cooling will be same for all three

28. a

Rate of loss of heat $\propto A$

☐ Sphere cools at slowest rate

29. The refractive index of glass is $\frac{3}{2}$ and refractive index of diamond is 2.4. The refractive index of diamond with respect to glass will be

a. 1.6 b. 3.6
c. 3.0 d. $2.4 \times \left(\frac{2}{3}\right)^2$

29. a

$${}_g\mu_d = \frac{\mu_d}{\mu_g} = \frac{2.4}{3/2} = 1.6$$

30. If the prism of angle 6° with refractive index $\frac{3}{2}$ is immersed in water of refractive index $\frac{4}{3}$, the deviation produced would be

a. 3° b. 45°
c. 12° d. 2°

30. b

$$\delta = (\mu_g \mu_w - 1)A = A \left(\frac{\mu_g}{\mu_w} - 1 \right)$$

$$\therefore \delta = \left(\frac{3/2}{4/3} - 1 \right) \times 6^\circ = 45^\circ$$

31. The magnifying power of an astronomical telescope is 8 and the distance between the two lenses is 54 cm, the focal length of eye lens and the objective lens will be respectively:

a. 6 cm and 48 cm b. 48 cm and 6 cm
c. 8 cm and 64 cm d. 64 cm and 8 cm

31. b

$$L = f_o + f_e = 54 \text{ cm}$$

And,

$$M = \frac{f_o}{f_e} = 8 \Rightarrow f_o = 8f_e$$

$$\Rightarrow 8f_e + f_e = 54 \Rightarrow f_e = \frac{54}{9} = 6 \text{ cm}$$

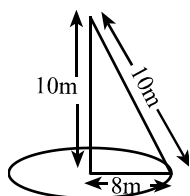
$$f_o = 8f_e = 8 \times 6 = 48 \text{ cm}$$

32. A lamp of 100 Cd power is suspended at a distance of 6m above centre of circular table of radius 8m. The illuminance at the corner of the table is

a. 0.6 lux b. 6 lux
c. 1 lux d. 0.8 lux

32. a

$$L = \frac{I \cos \theta}{r^2} = \frac{100 \times (6/10)}{10^2} = 0.6 \text{ lux}$$



33. A thin mica sheet of thickness 2×10^{-6} m and refractive index ($\mu = 1.5$) is introduced in the path of one of the waves. The wavelength of the wave used is 5000\AA . The central bright maximum will shift:
- a. 2 fringes upward b. 2 fringes downward
c. 10 fringes upward d. None of these

33. b

$$S = \frac{(\mu - 1)t}{\lambda}$$

$$= \frac{(1.5 - 1) 2 \times 10^{-6}}{5000 \times 10^{-10}} = 2 \text{ (Upward)}$$

34. The power produced by a prism of small angle A:

- a. Depends of material of prism only
b. Depends on A only
c. Depends both on material and A
d. Depends neither on material nor on A

34. a

Dispersive power of prism

$$\omega = \frac{\text{Angular dispersion}}{\text{Mean deviation}} = \frac{\delta_v - \delta_R}{\delta_y} = \frac{(\mu_v - \mu_R)}{(\mu_y - 1)}$$

35. Torque acting on electric dipole of dipole moment p placed in uniform electric field E is

- a. $p \times E$ b. $p \cdot E$
c. $p \times (E \times p)$ d. $\frac{E \cdot p}{p^2}$

35. a

Torque acting on electric dipole is given by $\tau = pE \sin\theta$

36. The terminals of a cell are short circuited, then terminal potential difference will be

- a. E b. $\frac{E}{2}$
c. ∞ d. Zero

36. d

Terminal p.d.

$$V = I R_{\text{ext}}$$

$$= I \times 0 = 0$$

37. A certain charge liberates 0.8 g of oxygen. The mass of silver liberated by the equal charge is:

- a. 10.8 g b. 108 g
c. 0.8 g d. $\frac{108}{0.8}$ g

37. a

$$\frac{m_1}{m_2} = \frac{E_1}{E_2} = \frac{\frac{16}{2}}{\frac{108}{1}} = \frac{8}{108}$$

$$\text{or, } \frac{0.8}{m_2} = \frac{8}{108}$$

$$\therefore m_2 = \frac{108 \times 0.8}{8} = 10.8 \text{ gm}$$

38. Energy stored in magnetic field of 2.5×10^{-3} T is:

- a. 2.48 J b. 0.48 J
c. 3.48 J d. 4.48 J

38. a

$$E = \frac{B^2}{2\mu_0} = \frac{(2.5 \times 10^{-3})^2}{2 \times 4\pi \times 10^{-7}} = 2.48 \text{ J}$$

39. Ballistic galvanometer is used to measure:

- a. Current b. Charge
c. Potential difference d. Capacitance

39. b

40. The permanent magnet is made from:

- a. Diamagnetic b. Paramagnetic
c. Ferromagnetic d. Soft iron

40. c

41. The armature of a DC motor has 20Ω resistance. If it draws a current of 1.5 A when run by 220V DC supply. The value of back emf induced in it will be:

- a. 150 V b. 170 V
c. 180 V d. 190 V

41. d

$$i = \frac{E - e}{R}$$

$$\text{Given, } R = 20\Omega, \quad E = 220 \text{ V, } i = 1.5 \text{ A}$$

$$1.5 = \frac{220 - e}{20}$$

$$\therefore e = 190 \text{ V}$$

42. Boron has two isotopes ${}^5\text{B}^{10}$ and ${}^5\text{B}^{11}$. If the atomic weight of boron is 10.81, the ratio of ${}^5\text{B}^{10}$ to ${}^5\text{B}^{11}$ in nature is:

- a. $\frac{19}{81}$ b. $\frac{20}{53}$
c. $\frac{15}{10}$ d. $\frac{10}{11}$

42. a

$$\text{At. wt } A = \frac{n_1 A_1 + n_2 A_2}{n_1 + n_2}$$

$$\text{or, } 10.81 = \frac{10n_1 + 11n_2}{n_1 + n_2}$$

$$\therefore \frac{n_1}{n_2} = \frac{19}{81}$$

43. The frequencies of X-rays, γ -rays and ultraviolet rays are represented by a, b and c. Then

- a. $a > b, b > c$ b. $a < b, b > c$
c. $a < b, b < c$ d. $a > b, b < c$

43. b

44. The relation between half life $T_{1/2}$ of a radioactive sample and its mean life τ is:

- a. $T_{1/2} = 0.693 \tau$ b. $\tau = 0.693 T_{1/2}$
c. $\tau = T_{1/2}$ d. $\tau = 2.718 T_{1/2}$

44. a

$$N = N_0 e^{-\lambda T} \Rightarrow \frac{N_0}{2} = N_0 e^{-\lambda T_{1/2}}$$

$$\Rightarrow T_{1/2} = \frac{\ln 2}{\lambda} = 0.693 \tau$$

45. The mass of a proton is 1.007825 u and of neutron is 1.008664 u, then the binding energy per nucleon of ${}^{35}_{17}\text{Cl}$ if its mass is 34.980 u is

- a. 4.1 MeV b. 8.2 MeV
c. 16 MeV d. 8.2 KeV

45. b

$$\text{Binding energy} = [\{Zm_p + (A - Z)m_n\} - M] \times 931 \text{ MeV}$$

$$= \{[17 \times 1.007825 + (35 - 17) \times 1.008665] - 34.980\} \times 931$$

$$= 288 \text{ MeV}$$

$$\therefore \text{BE per nucleon} = \frac{288}{35} = 8.2 \text{ MeV}$$

46. Forbidden energy gap shows the order

- a. conductor < semi-conductor < insulator
b. semi-conductor < conductor < insulator
c. conductor = insulator < semi-conductor
d. All the same

46. a

47. The value of β :

- a. is always less than 1
b. lies always 20 and 200
c. is always greater than 200
d. is always infinity

47. b

48. In order to rectify an alternating current, one uses a:

- a. thermo-couple b. junction diode
c. transistor d. oscilloscope

48. b

49. The space charge limited current in a diode is 5mA at 20V. At what voltage, its value will be 40mA?

- a. 160 V b. 20 V
c. 40 V d. 80 V

49. d

$$i \propto V^{\frac{3}{2}}$$

$$\Rightarrow V \propto i^{\frac{2}{3}}$$

$$\frac{V_2}{V_1} = \left(\frac{i_2}{i_1}\right)^{\frac{2}{3}}$$

$$\therefore V_2 = \left(\frac{40}{5}\right)^{\frac{2}{3}} \times 20 = 80 \text{ V}$$

50. Hubble's law is expressed as v = speed of recession, r = distance of galaxy, H = Hubble's constant:

- a. $v = Hr^2$ b. $v = Hr$
c. $v = H/r$ d. $v = H/r^2$

50. b

CHEMISTRY

51. A volatile oxide 'X' (non metal having At. wt. 14) is X_nO_4 . If Vapor density of oxide is 46, the value of n is:

- a. 1 b. 2
c. 3 d. 4

51. (b)

$$V.D = 46,$$

$$M.W = 2 \times V.D = 2 \times 46 = 92$$

$$\text{At. wt. of X} = 14$$

$$\text{or, } 14 \times n + 16 \times 4 = 92$$

$$\text{or, } 14n + 64 = 92$$

$$\text{or, } 14n = 92 - 64$$

$$\text{or, } 14n = 28$$

$$\therefore n = 2$$

52. The initial volume is 400 ml at 100°C , then find the volume at 0°C .

- a. 263ml b. 293 ml
c. 307 ml d. 363 ml

52. (b)

$$V_1 = 400 \text{ ml } T_1 = 373 \text{ K}$$

$$V_2 = ? \quad T_2 = 273 \text{ K}$$

$$\frac{V_2}{V_1} = \frac{T_2}{T_1} \text{ (At constant pressure)}$$

$$V_2 = \frac{T_2}{T_1} \times V_1 = \frac{273}{373} \times 400 = 293 \text{ ml}$$

53. "The relative lowering of vapour pressure is equal to the mole fraction of solute in the solution", is known as

- a. Henry's law
b. Vant Hoff's law
c. Rault's law
d. Ostwald's dilution law

53. (c)

Rault's law states that, "the relative lowering of the vapour pressure of a solution containing non volatile solute is equal to the mole fraction of solute".

- If P_o = Vapour pressure of pure solvent
 P_s = Vapour pressure of solution
 n = no. of moles of solute, N = no. of moles of solvent.

$$\text{Then, } \frac{P_o - P_s}{P_o} = \frac{n}{N + n}$$

54. In schottky defect

- a. Equal no of cations and anions occupy interstitial space
b. Equal no of cations and anions are missing from interstitial space
c. Density decreases
d. Unequal no of cations and anions are missing from interstitial space

54. (b)

Equal no of cations and anions are missing from interstitial space.

Schottky defect - equal no of anions & cations are missing from interstitial site.

- Occurs in ionic compound with high co-ordination number.
- Density of crystal decreases due to this defect.

55. The number of subshells in the fifth energy level is:

- a. 4 b. 11
c. 9 d. 5

55. (d)

- In n^{th} energy level, there are n sub-shells.

56. Which of the following exerts weakest intermolecular force?

- a. NH_3 b. He
c. H_2O d. HCl

56. (b)

Ionic > covalent > co-ordinate >

H-bond > dipole interaction > Vander waal

- 'He' molecules interact through Vander waal's bond so it is the weakest intermolecular force.

57. The no. of gm equivalents of a solute dissolved per litre of solution is called its:

- a. Molarity b. Normality
c. Molality d. Mole fraction

57. (b)

58. When concentration of reactant decrease, the rate constant:

- a. Increases
b. Decreases
c. Remains same
d. May increase or decrease

58. (c)

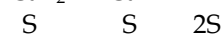
Rate constant of a reaction is independent of the concentration of the reactants and its value is constant at a particular temperature.

59. The solubility of the sparingly soluble salt CaF_2 is 2.03×10^{-4} mole L^{-1} . The solubility product is:

- a. 4.12×10^8 b. 3.45×10^{-11}
c. 4.04×10^{-4} d. 8.20×10^{-8}

59. (b)

$$3.45 \times 10^{-11}$$



$$K_{sp} = [\text{Ca}^{++}] [\text{F}^-]^2$$

$$= (\text{S}) (2\text{S})^2$$

$$= 4\text{S}^3$$

$$\approx 3.45 \times 10^{-11}$$

60. Heat exchanged in a chemical reaction, at constant temperature and pressure is called:

- a. Entropy b. Enthalpy
c. Free energy d. Internal energy

60. (b)

61. Volume of 5% (w/v) Na_2CO_3 required to neutralize 1 litre $\frac{\text{N}}{10}$ H_2SO_4 is:

- a. 102.68 b. 112.38
c. 104 d. 106.38

61. (d)

- Molecular mass of $\text{Na}_2\text{CO}_3 = 106.38$ gm

$$\therefore \text{Equivalent weight} = \frac{106.38}{2} = 53.19 \text{ gm}$$

Now,

$$\text{Normality of 5\% (w/v) } \text{Na}_2\text{CO}_3 = \frac{5 \times 1000}{53.19 \times 100}$$

$$= \frac{50}{53.19} \text{ N}$$

For resulting solution,

$$N_1 = \frac{50}{53.19} \text{ N}$$

$$V_1 = V$$

$$N_2 = \frac{\text{N}}{10}$$

$$V_2 = 1 \text{ litre} = 1000 \text{ ml}$$

For complete neutralisation,

$$N_1 V_1 = N_2 V_2$$

$$\frac{50}{53.19} \times V = \frac{1}{10} \times 1000$$

$$\therefore V = \frac{53.19 \times 1000}{50 \times 10}$$

$$= 106.38 \text{ ml}$$

62. Iodoform test is not answered by:

- a. CH_3OH b. $\text{C}_2\text{H}_5\text{OH}$
c. CH_3COCH_3 d. $\text{CH}_3 - \overset{\text{OH}}{\underset{|}{\text{CH}}} - \text{CH}_3$

62. (a)

63. Which of the following illustrates the law of reciprocal proportion?

- a. CH_4 , CO_2 , H_2O b. H_2S , CO , CO_2
c. P_2O_5 , PCl_3 , PCl_5 d. NH_3 , NO_2 , SO_2

63. (a)

(i) H_2S , H_2O and SO_2

(ii) CH_4 , CO_2 and H_2O show law of reciprocal proportions.

64. pH of $\frac{\text{N}}{10}$ NaOH will be

- a. 10 b. 1
c. 7 d. 13

64. (d)

$$\text{No. of moles of NaOH} = \frac{4}{40} = \frac{1}{10} = 10^{-1}$$

$$\text{pOH} = -\log[\text{OH}^-] = -\log[10^{-1}] = 1$$

$$\text{pH} = 14 - \text{pOH} = 14 - 1 = 13$$

65. The kinetic energy of a gram molecule of an ideal gas depends upon

- a. Volume b. Pressure
c. Temperature d. No of moles

65. (c)

According to kinetic theory of gas, "The average kinetic energy of a gas molecule is directly proportional to its temperature."

66. Which of the following set of quantum numbers is correct for 4f?

- a. $n = 4, l = 3, m = 1, s = +\frac{1}{2}$
b. $n = 4, l = 4, m = 1, s = -\frac{1}{2}$
c. $n = 4, l = 2, m = -2, s = -\frac{1}{2}$
d. $n = 3, l = 3, m = -4, s = +\frac{1}{2}$

66. (a)

- For quantum number of 4f, $n = 4$
i.e. principal quantum number is 4
- Azimuthal quantum number (l) for s sub-shell (l) = 0
p sub-shell (l) = 1
d sub-shell (l) = 2

f sub-shell (l) = 3

- Magnetic quantum number (m) - Ranges from -l to +l i.e. = -3 to +3 (for 4f).
- Spin quantum number(s) = $+\frac{1}{2}$ or $-\frac{1}{2}$

67. For the reaction $\text{H}_2 + \text{I}_2 \rightleftharpoons 2\text{HI}$

- a. $K_P = K_C$ b. $K_C > K_P$
c. $K_C = 2K_P$ d. $K_C < K_P$

67. (a)

$$K_P = K_C (RT)^{\Delta n}$$
$$\Delta n = n_P - n_R = 2 - 2 = 0$$
$$K_P = K_C (RT)^0$$
$$K_P = K_C$$

68. The radius of first orbit of hydrogen is 0.53\AA . The radius of second orbit would be:

- a. 1.06\AA b. 2.12\AA
c. 0.53\AA d. 0.26\AA

68. (b)

$$r_n(\text{H}) = r_0(\text{H}) \cdot n^2$$
$$= 0.53 \times 2^2$$
$$= 2.12\text{\AA}$$

69. The no of ' σ ' and ' π ' bond in 'C' atoms of CaC_2 is:

- a. $1\sigma, 2\pi$ b. $2\sigma, 2\pi$
c. $3\sigma, 2\pi$ d. $4\sigma, 2\pi$

69. (a)

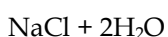
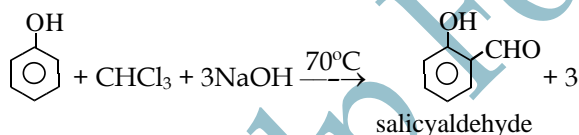


70. Reimer Tiemann reaction is used in the manufacture of:

- a. Benzaldehyde b. Salicylaldehyde
c. Phenol d. Alcohol

70. (b)

Reimer Tiemann reaction:



71. The double strands (or double helix) structure of DNA is due to

- a. Hydrogen bonding
b. Electrostatic attraction
c. Vander wall's force
d. Dipole - dipole interaction

71. (a)

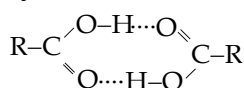
The two strands of DNA are held together by H-bonding

72. Teflon is a polymer of

- a. Tetrafluoroethylene
b. Tetraiodoethylene
c. Tetrabromoethylene
d. Tetrachloroethylene

72. (a)

Teflon is obtained by the polymerization of tetrafluoroethylene.



- Boiling points of acids are higher than corresponding alcohols, carbonyl compound, amines or acid derivatives due to greater extent of hydrogen bonding.

73. Alkanes are represented by general formula

- a. $\text{C}_n \text{H}_{2n}$ b. $\text{C}_n \text{H}_{2n+2}$
c. $\text{C}_n \text{H}_{2n-1}$ d. $\text{C}_n \text{H}_{2n+1}$

73. (b)

Alkanes = $\text{C}_n \text{H}_{2n+2}$

Alkenes = $\text{C}_n \text{H}_{2n}$

Alkynes = $\text{C}_n \text{H}_{2n-2}$

74. Amino acids are produced by the hydrolysis of

- a. Fats b. Proteins
c. Nucleic acids d. Carbohydrate

74. (b)

75. The effect which occurs in double bond in presence of attacking reagent is called as:

- a. Hyperconjugation b. Electromeric effect
c. Resonance d. Inductive effect

75. (b)

- Electromeric effect is temporary displacement of shared pair of π -electrons in the presence of attacking reagent.
- Electromeric effect comes to play instantaneous at the demand of attacking reagent.
- Resonance is permanent and strongest of all other effect in which delocalization of lone pair of electrons and π -pair of electrons takes place.

76. A compound 'Y' is treated with acidified $\text{K}_2\text{Cr}_2\text{O}_7$ and doesn't give 2,4 - DNP test is:

- a. Ethanol b. 2-methyl propan -2-ol
c. Propan -2- ol d. Propanol

76. (b)

- Alcohols upon controlled oxidation with oxidizing agent like acidified $\text{KMnO}_4/\text{K}_2\text{Cr}_2\text{O}_7/\text{CrO}_3$ etc give carbonyl compound.

1° alcohol $\xrightarrow{[\text{O}]}$ Aldehyde

2° alcohol $\xrightarrow{[\text{O}]}$ Ketone

3° alcohol $\xrightarrow{[\text{O}]}$ alkenes

- Alkene doesn't give 2,4-DNP reaction.

77. The Cannizzaro's reaction is not given by:

- a. Trimethyl aldehyde
b. Acetaldehyde
c. Benzaldehyde
d. Formaldehyde

77. (b)

Cannizzaro's reaction is given by the aldehydes which donot contain α -hydrogen.

78. Nitration in Benzene is reaction.

- a. An electrophilic substitution
b. A nucleophilic substitution
c. An electrophilic addition
d. A nucleophilic addition

78. (d)

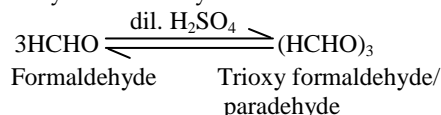
- Nitration, Halogenation and sulphonation of Benzene are Electrophilic substitution.

79. When formaldehyde is polymerized in presence of dilute H_2SO_4 , the compound obtained is:

- Paraldehyde
- Metaldehyde
- Paraformaldehyde
- Trioxo formaldehyde

79. (d)

Trioxo formaldehyde



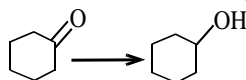
80. Aspirin is:

- Analgesic
- Antipyretic
- Antiseptic
- Both (a) and (b)

80. (d)

Aspirin gives immediate relief from pain and fever so it is both analgesic and anti pyretic.

81. The conversion shows below may be described as which of the following types of reaction?



- addition
- reduction
- substitution
- addition and reduction

81. (d)

- Here carbonyl compound is reduced to alcohol by addition of proton.
- Carbonyl compound shows nucleophilic addition reaction.

82. Which of the following will show geometrical isomerism?

- $\text{CH}_3\text{CH}=\text{CHCH}_3$
- $(\text{CH}_3)_2\text{C}=\text{C}(\text{CH}_3)_2$
- $(\text{CH}_3)_2\text{C}=\text{C}(\text{CH}_3)_2$
- $\text{CH}_3-\text{CH}=\text{C}(\text{CH}_3)_2$

82. (a)

If one of the two doubly bonded carbon atom carries two identical atoms or groups, then the molecule doesn't exhibit geometric isomerism.

83. Which of the following will have least hindered rotation about carbon bond?

- Acetylene
- Hexachloroethane
- Ethane
- Ethylene

83. (c)

In ethane, there is Carbon -Carbon Single bond which has lower hindrance to rotation than C-C double & triple bound.

84. Methyl alcohol reacts with phosphorus trichloride to form

- Methane
- Methyl chloride
- Acetyl chloride
- Dimethyl ether

84. b

85. In presence of sodium ethoxide two molecules of ethyl acetate interact to form acetoacetic ester this process is known as:

- Aldol condensation
- Claisen condensation
- Polymerization
- Claisen Schmidt reaction

85. (b)

Claisen condensation reaction

Ester containing α -hydrogen when treated with strong bases such as sodium ethoxide undergo condensation form Ketoesters.

86. Azo dyes are prepared from

- Aniline
- Benzaldehyde
- Benzoic acid
- Phenol

86. (d)

Azo dyes are prepared by coupling between a diazonium salt, phenol or an amine.

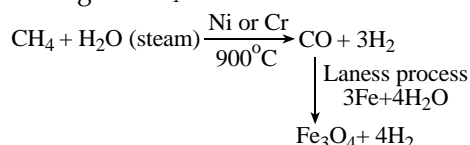
87. Commercial hydrogen is obtained from:

- Coal gas
- Oil gas
- Marsh gas
- Producer gas

87. (c)

Producer gas: $\text{CO} + \text{N}_2$

Marsh gas: CH_4



88. Which of the following gas is formed by the action of water on sodium peroxide?

- H_2
- O_2
- Na
- H_2O

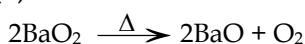
88. (b)



89. The oxide which on strong heating evolves oxygen is

- Na_2O
- Al_2O_3
- CaO
- BaO_2

89. (d)



90. Zeolites are substances used to remove hardness of water, their chemical formula is:

- Al silicate
- $\text{Ca}(\text{OH})_2$
- MgCl
- SiO_2

90. (a)

Permutit process of removal of permanent hardness of water uses zeolites i.e. Sodium Aluminium orthosilicate ($\text{Na}_2\text{Al}_2\text{Si}_2\text{O}_8 \cdot x\text{H}_2\text{O}$).

91. K_a of H_2O_2 is the order of

- 10^{-12}
- 10^{-14}
- 10^{-16}
- 10^{-10}

91. (a)

92. Elements of group 14:

- Exhibit oxidation state of +4
- Exhibit oxidation state of +2 and +4
- Form M^{2-} and M^{4+} ion
- Form M^{2+} and M^{4+}

92. b

93. Which oxidation state is not shown by carbon in its compound?

- a. -4 b. +4
c. +1 d. 0

93. (c)

+ 1 oxidation state is not shown by carbon in its compound

94. When lead nitrate is heated it produces

- a. NO₂ b. NO
c. N₂O₅ d. N₂O

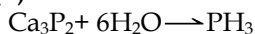
94. (a)



95. Phosphine may be produced by adding water to some

- a. P₄O₆ b. P₄O₁₀
c. HPO₃ d. Ca₃P₂

95. (d)



96. Size of ionic species follows the order:

- a. $\text{I}^- < \text{I}^+ < \text{I}$ b. $\text{I}^- < \text{I} < \text{I}^+$
c. $\text{I}^+ < \text{I} < \text{I}^-$ d. $\text{I}^+ < \text{I}^- < \text{I}$

96. (c)

Anions are larger in size whereas cations are smaller than their parent atom.

97. The valency of inert gas is

- a. zero b. 1
c. 2 d. 3

97. (a)

The valency of inert gas is zero

98. In the froth floatation process used for the purification of ores, the ore particles float because

- a. They are light
b. Their surface is hydrophobic
c. They bear electrostatic charge
d. They are insoluble

98. (b)

In froth floatation process different particles have different attraction for liquid and are preferentially wetted by these liquids.

99. A metal never found in free state is:

- a. Au b. Cu
c. Ag d. Fe

99. d

100. In order to prevent photo-oxidation, silver nitrate is kept in

- a. Bottle
b. Light colored bottle
c. Steel container
d. Dark colored bottle

100. (d)

AgNO₃ is photosensitive compound and is decomposed in light.

Dark colored glass doesn't allow the light to pass through it.

BOTANY

101. Sweet Potato is modification of:

- a. Stem b. Flowering axis
c. Root d. Bud

101. c

Potato is modification of stem

Sweet potato is modification of root

102. The fruit that develops from inflorescence is called:

- a. Simple fruit b. Aggregate fruit
c. Composite Fruit d. None

102. c

Multiple or composite fruit develops from inflorescence.

103. Axile Placentation is characteristics of:

- a. Malvaceae b. Solanaceae
c. Liliaceae d. All

103. d

So → Solanaceae

Ma → Malvaceae

Li → Liliaceae

A → Axile placentation

104. Hybridization followed by polyploidy is called as:

- a. Autopolyploidy b. Allopolyploidy
c. Aneuploidy d. Euploidy

104. (b)

105. Tallest Pteridophytes is:

- a. *Alsophila* b. *Cyathea*
c. *Pteris* d. *Dryopteris*

105. (a)

- Largest Pteridophyte: *Cyathea*
- Tallest Pteridophyte: *Alsophila*
- Smallest Pteridophyte: *Azolla*

106. Chloroplast is found in spores of

- a. *Riccia* and *Marchantia*
b. *Funaria* and *Equisetum*
c. *Funaria* and *Sphagnum*
d. *Funaria* and *Anthoceros*

106. (b)

- Chloroplast is found in *Funaria* and *Equisetum*.

107. The P/O ratio (No. of ATP produced to the no. of O₂ converted into H₂O) in the first step of glycolysis is:

- a. 1/1 b. 1/2
c. 0/0 d. 1/0

107. c

P/O is 0/0 as neither ATP formed and nor O₂ is released.

108. By weight, each gram of glucose yields biological energy.

- a. 9.45 kcal b. 686 kcal
c. 4.3 kcal d. 4.1 kcal

108. d

One mole of glucose represent C₆H₁₂O₆ (=180g). 180g glucose yields 686 kcal and therefore 1g will yield 686/180=3.8 kcal or 15.94 KJ.

109. Loading of phloem is related to:

- a. Increase of sugar in phloem
b. Elongation of phloem cell
c. Separation of phloem parenchyma
d. Strengthening of phloem fibres

109. a

According to mass flow -hypothesis, sugar is translocated on mass through phloem along the TP. This increase of sugar in phloem during translocation is called loading of phloem.

110. Guard cell of the stoma is

- a. Kidney shaped
- b. Convex shaped
- c. Longitudinal and cylindrical shaped
- d. Dumb bell shaped

110. (a)

- Guard cell of stoma of normal dicot plant is kidney shaped.
- Guard cell of stoma of normal monocot plant is dumb-bell shaped.

111. Sugarcane shows high efficiency of CO₂ fixation because it performs

- a. Calvin cycle
- b. EMP pathway
- c. Hatch & Slack pathway
- d. TCA cycle

111. (c)

- C₄ or Hatch & Slack Pathway was 1st observed in sugarcane by Kortschak.
- Common in a number of tropical plants both monocots & dicots. E.g. Maize, Sugarcane, Sorghum, Millet, Amaranthus etc.

112. Which of the following component of plants have no nucleus?

- a. Companion cells
- b. Sieve tube
- c. Pith
- d. Cambium

112. (b)

- Primary function of sieve tube is to transport sugars & other important molecules necessary for plants.
- Sieve tube cells are analogous to RBCs of mammals, both living but enucleated at maturity.

113. Jewels of plant kingdom are:

- a. bacteria
- b. diatoms
- c. dinoflagellates
- d. none

113. (b)

- Jewels of plant kingdom: Diatoms
- Jewels of pond: Volvox

114. Which one is a true moss?

- a. Cord moss
- b. Bog or peat moss
- c. Hair cap moss
- d. All of the above

114. d

True mosses:

- *Funaria*–Cord moss
- *Polytrichum*–Hair cap moss
- *Sphagnum* – Peat or Bog moss

115. Xylem in root is

- a. endarch
- b. exarch
- c. mesarch
- d. none

115. (b)

- Xylem is endarch in stem and exarch in roots.

116. Total number of haploid nuclei in an embryo sac is

- a. 4
- b. 8
- c. 6
- d. 3

116. (b)

- The monosporic embryo sac divides to form 7 celled and 8 nucleated embryo sac & also known as *Polygonum* type of embryo sac.

117. Rejection of transplanted organ is due to

- a. T-cells
- b. B-cells
- c. Eosinophils
- d. Neutrophils

117. (a)

- It is due to cellular immunity. T-lymphocytes play role in tissue rejection.

118. Tea is a good stimulant due to presence of

- a. Morphine
- b. Ephedrine
- c. Nicotine
- d. Caffeine

118. (d)

119. Tendrils exhibit/twinning of tendrils is due to:

- a. Seismonasty
- b. Thigmotropism
- c. Heliotropism
- d. Diageotropism

119. (b)

120. Gaseous exchange in submerged plant occurs by:

- a. Hydathodes
- b. Lenticels
- c. Stomata
- d. General surface

120. (d)

Guttation: Loss of water in the form of water drops along with minerals from **hydathode**.

121. Monoecious plant is

- a. Haploid
- b. Diploid
- c. Both male and female
- d. Male or female

121. (c)

122. Sexual reproduction does not occur in

- a. *Nostoc*
- b. *Riccia*
- c. *Ulothrix*
- d. *Rhizopus*

122. (a)

Nostoc is blue green algae also called as cyanobacteria.

123. True alternation of generation is found in:

- a. *Spirogyra*
- b. *Mucor*
- c. *Selaginella*
- d. All of these

123. (c)

Selaginella is a Pteridophyte.

124. Which group contains fibre yielding plant of economic importance?

- a. *Gossypium*, *Crotalaria* and *Hibiscus*
- b. *Gossypium*, *Agave* and *Cassia*
- c. *Gossypium*, *Cassia* and *Lycopersicum*
- d. *Gossypium*, *Brassica* and *Nicotiana*

124. (a)

Gossypium hirsutum–cotton

Seed surface (testa) of different species of *Gossypium* is source of cotton fibres.

Crotalaria juncea - Sun hemp

Fibres from phloem and pericycle of stem (bast fibres) are obtained, used for making ropes, mats, etc.

Hibiscus cannabinus – Deccan

Hemp (Secondary phloem) of its stem is source of bast fibre.

125. Shrubs have strong wood trunks and they are free supporters. These types of shrubs are found mainly in:

- a. Tropical rain forest
- b. Temperate forest
- c. Alpine habitat
- d. None

125. (a)

- Lianas are woody climbers and twinners; commonly found in tropical rain forest.

126. The total number of base pairs in one turn in B-DNA is:

- a. 11
- b. 12
- c. 10
- d. 9

126. (c)

- B-DNA is the most common DNA.
- One complete turn of B-DNA helix contains 10 base pairs and the length between successive base pairs is 3.4 Å.

127. In mitochondria which is present

- a. Oxsomes
- b. Quantasomes
- c. Thylakoids
- d. Cisternae

127. (a)

- Oxsome is found in mitochondria, contains ATPase acting as centre of ATP synthesis during oxidative phosphorylation.

128. The marker enzyme of mitochondria is

- a. Pyruvate dehydrogenase
- b. Aldolase
- c. Amylase
- d. Succinic dehydrogenase

128. (d)

- The enzymes that are found only in mitochondria are called **marker enzymes of mitochondria**.
- All enzymes of Krebs cycle are found in matrix except succinic dehydrogenase that is found in inner membrane.

129. Enzyme required for removing RNA primer during DNA replication is:

- a. Ligase
- b. DNA polymerase III
- c. DNA polymerase I
- d. Primase

129. (c)

- RNA primers are removed by **DNA polymerase I**.
130. What will be the codons in m-RNA if the DNA codes are ATG-CAG?

- a. UCA-TUA
- b. TCA-GTC
- c. TAC-GTC
- d. UAC-GUC

130. (d)

- **Codons on m-RNA**

DNA	m-RNA
A	U
T	A
G	C
C	G

131. The enzymes of glycolysis are located in the:

- a. Cytoplasm
- b. Lysosomes
- c. Mitochondrion
- d. Nucleus

131. (a)

- Enzymes of glycolysis is present in the cytoplasm.

132. The type of ribosomes found in prokaryotic cells are:

- a. 100s
- b. 60s

- c. 80s
- d. 70s

132. (d)

- 70s type of ribosomes is found in prokaryotic cell and in mitochondria and chloroplast of eukaryotic cell.

133. Transfer of genetic information from a molecule of DNA into mRNA is known as:

- a. Transcription
- b. Translation
- c. Replication
- d. Transduction

133. (a)

- Central dogma indicates unidirectional **flow of information from DNA to mRNA by the process of transcription**, and then to protein by the process of translation.

134. The most striking example of point mutation is:

- a. Thalassaemia
- b. Sickle-cell anaemia
- c. Colour blindness
- d. Haemophilia

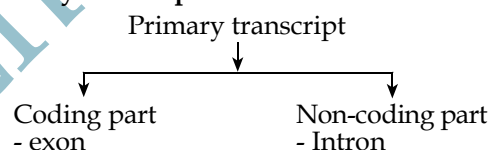
134. (b)

135. When the unwanted introns are removed and functional regions (exons) are responsible for coding in transcription. This process is known as

- a. Transduction
- b. Splicing
- c. Inducing
- d. Constitutive genes

135. (b)

- **m- RNA** formed after transcription is called **primary transcript**



- **Removal of introns from exon is called splicing**

136. Height, skin colour etc are controlled by

- a. Polygenic inheritance
- b. Mutation
- c. Pleiotropism
- d. Multiple allelism

136. (a)

- When regulation of a trait is carried out by genes of more than one locus, it is called **polygenic inheritance**. E.g. Skin colour, Height: IQ in animals and Number, size of flowers, fruits and seed, Kernel colour of wheat in plant.

137. In Terai region, the most common disease that appears among the Tharu community is:

- a. Phenylketonuria
- b. Sickle cell anemia
- c. Hemophilia
- d. Colour blindness

137. (b)

- Sickle cell anemia is due to point mutation and is very common among the Tharu community in Terai of Nepal.

138. The most stable ecosystem is

- a. Forest
- b. Mountain
- c. Desert
- d. Ocean

138. d

139. Insectivorous plants grow in the soil which is deficient in :

- a. Calcium b. Nitrogen
c. Water d. Magnesium

139. b

140. The pyramid of energy is always

- a. Erect b. Inverted
c. Linear d. Pyramidal

140. a

ZOOLOGY

141. Number of spermatozoa formed by single primary spermatocyte is:

- a. 1 b. 2
c. 4 d. 3

141. (c)

- So, 1 primary spermatocyte forms 4 spermatozoa.
- 1 secondary spermatocyte forms 2 spermatozoa

142. Which of the following characterizes chordates?

- a. A ventral heart with dorsal blood vessel
b. A dorsal heart with ventral blood vessel
c. A ventral heart with dorsal & ventral blood vessel
d. A dorsal heart with dorsal & ventral blood vessel

142. (c)

Diagnostic characters of chordates:

- a. Notochord (endodermal):
- Present between nerve chord & alimentary canal.
 - It is replaced by vertebral column in adult.
- b. Dorsal tubular Nerve cord
c. Pharyngeal Gill slits
d. Post anal tail

143. Cornea transplantation is most successful because:

- a. It is avascular i.e. devoid of blood supply
b. It is dead cell
c. It respire from atmosphere
d. It does not need nutrition

143. (a)

- Due to avascular nature i.e. due to devoid of blood supply, cornea transplantation is most successful.
- Embryonic origin of the cornea, lens and retina is ectodermal.
- Cornea transplantation is known as keratoplasty.

144. Trichomonas is:

- a. Intercellular b. Endoparasite
c. Pathogenic d. All

144. (d)

Trichomonas vaginalis inhabits vagina of women and causes the disease known as leucorrhoea.

145. Collar cells are found in:

- a. Earthworm b. Mollusca
c. Coelenterata d. Sponges

145. (d)

- The collar cells are characteristics of phylum Porifera.

146. Hydra can digest all types of food except:

- a. Proteins b. Fats

- c. Starch d. Sugars

146. (c)

Coelenterates are carnivorous. They can digest all food except starch.

Amoeba cannot digest fat.

147. Gonophore in *Fasciola hepatica* is located at:

- a. The posterior most tip of the body
b. One-third part from the anterior region
c. Anterior to the acetabulum
d. Posterior to the acetabulum

147. (c)

148. Which of the following is the first unisexual phylum?

- a. Platyhelminthes b. Nematelminthes
c. Protozoa d. Arthropoda

148. (b)

Nematelminthes is the first unisexual phylum.

149. Avian influenza is:

- a. Type A b. Type B
c. Type C d. Type D

149. (a)

150. *Ascaris lumbricoides* belongs to the phylum:

- a. Nematoda b. Platyhelminthes
c. Mollusca d. Echinodermata

150. (a)

- *Ascaris* belongs to the phylum Nematoda.
- Nematoda is the first unisexual phylum.

151. Chief excretory matter in *Echinodermata* is

- a. Ammonia b. Urea
c. Uric acid d. Amino acid

151. (a)

The chief excretory product of animals living in water is ammonia.

152. Respiratory organ in scorpion is:

- a. Book gills b. Book lungs
c. Gills d. Skin

152. (b)

Respiratory organ of Crustacea is body surface or gills

Respiratory organ of Chilopoda is Trachea

Respiratory organ of Diplopoda is Trachea.

Respiratory organ of Insecta is Trachea

Respiratory organ of Arachnida is Book lungs.

153. Tendon connects:

- a. Bone to bone b. Bone to muscles
c. Muscle to muscles d. Bone of cranium

153. b

Tendon connects bone to muscles and muscles to muscles.

Ligament connects bone to bone.

154. Which of the following is formed during gastrulation?

- a. Archenteron b. Notochord
c. Myotome d. Nerve cord

154. a

Germ - layers are seen in gastrula.

155. Long sightedness is caused by:

- a. Shortening of Eyeball b. Decrease in focal length

- c. Enlargement of Eyeball d. Increase in focal length

155. a

Short-sightedness is caused by elongation of eyeball.

156. Glucose is stored in the form of glycogen in:

- a. Kidney b. Liver
c. Pancreas d. Spleen

156. (b)

Glycogen is the reserve food material for animals where it is stored in liver in human beings.

157. The organ of hearing is the:

- a. Semicircular canal b. Organ of corti
c. Tympanic d. Oval window

157. (b)

158. Typhoid is the diseases in which there is infection of

- a. Large intestine b. Small intestine
c. Stomach d. Duodenum

158. b

Widal test is the diagnostic test for typhoid.

159. The muscular diaphragm is the characteristics of:

- a. Pisces b. Reptiles
c. Aves d. Mammals

159. (d)

The presence of diaphragm is the typical characteristic of mammals.

160. Which of the following system is called the pacemaker system of our human body?

- a. SA Node b. AV Node
c. Parasympathetic system
d. Sympathetic system

160. (c)

Parasympathetic nervous system is active during rest or relaxed state. Due to this reason, the parasympathetic nervous system is also known as the "pacemaker of body". Parasympathetic system is essential to life
SA Node is called the pacemaker of the heart.
AV Node is called the pacesetter of the heart.

161. Longest cranial nerve is

- a. Abducens b. Vagus
c. Hypoglossal d. Auditory

161. (b)

- Musician's nerve: Ulnar
- Labourer's nerve: Median
- Jacobson's nerve: Branch of IX cranial nerve
- Dentist's nerve: Trigeminal
- Longest nerve: Sciatic
- Pathetic nerve: Trochlear

162. Endoskeleton of sponge is made up of:

- a. Cartilage
b. Bones
c. Calcareous spicules, silicious spicules & spongin fibres
d. All

162. c

- Almost all sponges possess an internal skeleton. It may consist of calcareous or

siliceous spicules or fine spongin fibres or of both, located in the mesohyal layer. Spicules are made up of calcium carbonate.

163. Renal portal system is most developed in

- a. Fishes b. Amphibians
c. Reptiles d. Birds

163. a

164. Which of these is a tree frog?

- a. *Rana* b. *Hyla*
c. *Alytes* d. *Necturus*

164. b

Hyla: tree frog

Rhacophorus: flying frog

Alytes: Midwife toad

165. "Anal style" is found in

- a. Male cockroach b. Female cockroach
c. Both d. None

165. (a)

This can be remembered as "men (male) are stylish".

166. *Ascaris lumbricoides* belongs to the phylum:

- a. Nematoda b. Platyhelminthes
c. Mollusca d. Echinodermata

166. (a)

- *Ascaris* belongs to the phylum Nematoda.
- Nematoda is the first unisexual phylum.

167. Water balance in *Paramecium* is maintained by the action of contractile vacuoles. This is an example of:

- a. Phagocytosis b. Homeostasis
c. Locomotion d. Perspiration

167. b

168. Which of the following cannot be prevented by vaccination?

- a. Cervical cancer b. Asthma
c. Hepatitis B d. Measles

168. (b)

- It is an allergic attack of breathlessness associated with bronchial obstruction or spasm of smooth muscle (contraction), characterized by coughing, difficult breathing and wheezing.

- It cannot be cured by vaccination

169. Typhoid is the diseases in which there is infection of:

- a. Large intestine b. Small intestine
c. Stomach d. Duodenum

169. b

Typhoid is also called as the enteric fever.

Widal test is the diagnostic test for typhoid.

Infection localizes in Payer's patches of ileum (lymphoid tissues of ileum).

170. Leydig cells are present in:

- a. Ventricles of heart
b. Ventricle of brain
c. Connective tissue of testes
d. Bartholin's gland

170. (c)

- Leydig cells, also known as interstitial cells of Leydig, are found adjacent to the seminiferous tubules in the testicles.

- They produce testosterone in the presence of luteinizing hormone.

171. Malaria is caused by:

- Female *Anopheles*
- Female *Culex*
- Plasmodium*
- Male *Anopheles*

171. c

172. On smoking, oral cancer is due to:

- Nicotine
- Tar
- Polycyclic aromatic hydrocarbon
- Carbon monoxide

172. (c)

- Cigarette smoke is an extremely complex chemical composition, contains numerous toxic & carcinogenic substances, including many polycyclic aromatic compounds.
- Polycyclic aromatic hydrocarbons are carcinogenic.

173. Embryologists can presume the future organs of the embryo in:

- Blastula
- Pre-gastrula
- Morula
- Post-gastrula

173. (a)

- Presumptive areas are evident in blastula. In gastrula, germ layers are formed. In post gastrula, organogenesis starts.

- A fate map may be defined as a topographical surface of the blastula with respect to the ultimate fate of that area in the adult frog.

174. Feeding stage of *Plasmodium* is:

- Merozoite
- Trophozoite
- Sporozoite
- Gametocyte

174. b

175. Paired spermatheca occurs in pheretima in segments

- 5/6, 6/7, 7/8, 8/9
- 6/7, 7/8, 8/9, 9/10
- 14/15, 15/16, 16/17, 17/18
- 1/2, 2/3, 3/4, 4/5, 17/18

175. a

176. In Pheretima, which of the following is not a part of male reproductive system?

- Seminal vesicle
- Spermathecae
- Spermiducal funnel
- Vas efferentia

176. b

177. Bleeding disorder is due to deficiency of:

- Vitamin C
- Vitamin A
- Vitamin B₁₂
- Vitamin K

177. (d)

- It is required for the synthesis of clotting factors II, VII, IX and X; hence also called anti-hemorrhagic factor.

- It's deficiency leads to bleeding disorder.

178. The thoracic cavity & abdominal cavity are formed by partition termed as

- Diaphragm
- Rib
- Abdominal wall
- All

178. (a)

Diaphragm is an exclusive character of mammals and is a skeletal muscle required for respiration.

179. The pH of human urine is:

- 2.00
- 6.00
- 7.5
- 8.00

179. (b)

- Urine is slightly acidic (pH ≈ 6.0) and has higher specific gravity than water (1.020 – 1.030).

180. Sudden appearance of an ancestral character is called:

- Evolution
- Mutation
- Atavism
- Heredity

180. c

Sudden heritable change is called mutation.

Sudden appearance of an ancestral character is atavism.

MAT

181.

16	12	?
15	11	8
14	10	7

- 8
- 9
- 12
- 14

181. b

182. The four children in the Speer family are Owen, Chadd, Steph and Daria. Chadd is neither the youngest nor the oldest. Daria is one of the two older children. Steph is the youngest child. Owen is often taken care of by his older brother and sister. Who is the oldest child?

- Chadd
- Daria
- Owen
- Steph

182. b

183. Which figure below, when placed together with the figure given, will make a complete circular disc with no overlap and no spaces?



a.



b.



c.



d.



183. b

184. A four-digit integer, WXYZ, in which W, X, Y and Z each represent a different digit, is formed according to the following rules.

1. $X = W + Y + Z$
2. $W = Y + 1$
3. $Z = W - 5$

What is the four-digit integer?

- a. 5940 b. 4950
c. 9540 d. 4059

184. a

185. All widgets are red. Everything red is square. Some things that are red have holes in the middle. Therefore:

- a. All widgets are square
- b. Everything with a hole in the middle is a widget
- c. Neither of the above is true
- d. Both a and b are true

185. a

All widgets are square

186. 2, 7, 27, 107, 427, ?

- a. 1262 b. 1707
c. 4027 d. 4207

186. b

The pattern is +5, +20, +80, +320,i.e. $+(5 \times 1^2)$, $+(5 \times 2^2)$, $+(5 \times 4^2)$, $+(5 \times 8^2)$,
So, missing term = $427 + (5 \times 16^2) = 427 + 1280 = 1707$

187. Which term will replace the question mark in the series?

ABD, DGK, HMS, MTB, SBL, ?

- a. ZKU b. ZKW
c. ZAB d. XKW

187. b

Clearly, the individual letters of the terms of the given series follow the pattern shown below:

1st letter : A $\xrightarrow{+3}$ D $\xrightarrow{+4}$ H $\xrightarrow{+5}$ M $\xrightarrow{+6}$ S $\xrightarrow{+7}$

2nd letter : B $\xrightarrow{+5}$ G $\xrightarrow{+6}$ M $\xrightarrow{+7}$ T $\xrightarrow{+8}$ B $\xrightarrow{+9}$

3rd letter : D $\xrightarrow{+7}$ K $\xrightarrow{+8}$ S $\xrightarrow{+9}$ B $\xrightarrow{+10}$ L $\xrightarrow{+11}$

188. In a class of 60, where girls are twice that of boys, Kamal ranked seventeenth from the top. If there are 9 girls ahead of Kamal, how many boys are after him in rank?

- a. 3 b. 7
c. 12 d. 23

188. c

Let the number of boys be x. Then, number of girls = 2x

$\therefore x + 2x = 60$ or $3x = 60$ or $x = 20$

So, number of boys = 20 and number of girls = 40

Number of girls ahead of Kamal in rank = 9

Number of girls behind Kamal in rank = $(40 - 9) = 31$

\therefore Number of boys behind Kamal in rank = $(20 - 9) = 11$

189. In the questions you are given a combination of alphabets and/or numbers followed by four alternatives (a), (b), (c) and (d). Choose the alternative which most closely resembles the mirror image of the given combination.

NATIONAL

(a) LANOITAN

(b) LANOITAN

(c) LANOITAN

(d) LANOITAN

189. b

190.

31	17	87
68	19	56
91	22	50
10	142	?

- a. 3 b. 6
c. 7 d. 9

190. c

The sum of the numbers in each column is 200.

\therefore Missing number = $200 - (87 + 56 + 50) = 7$

191. A person has 4 coins each of different denomination. What is the number of different sums of money the person can form (using one or more coins at a time)?

- a. 26 b. 15
c. 12 d. 11

191. b

192. A group of friends went to a hotel for dinner. After having their dinner, the bill amount was of Rs. 2400. So, they decided to distribute it into equal amount for each. In the group two friends forget to bring their purses along with them. So, 1 (Z) on it has been decided that Rs. 100 has to be paid more by the other friends on calculated amount. So, total how many friends were there in the group?

- a. (K) 16 b. 8
c. 12 d. 21

192. b

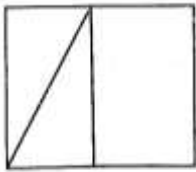
(W)

193. A cube is to be coloured in such a way as to avoid the same colour on adjacent surfaces. What is the minimum number of colours you will require?

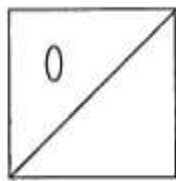
- a. Four b. Three
c. Two d. Five

193. b

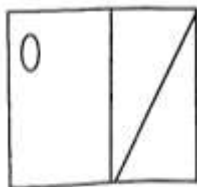
194. The figure on the left has been distorted. What did it look like before it was distorted?



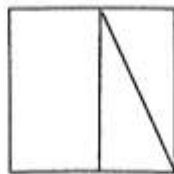
A



B



C



D

194. c

195. Which of the following statements must be true when $a^2 < b^2$ and a & b are not 0?

i. $\frac{a^2}{a} < \frac{b^2}{a}$

ii. $\frac{1}{a^2} > \frac{1}{b^2}$

iii. $(a + b)(a - b) > 0$

- a. I only b. II only
c. II and III d. I and II

195. b

196. Fill in the blank.

A	E	I
D	I	N
I	O	?

- a. U b. V
c. W d. X

196. a

$A \xrightarrow{+4} E \xrightarrow{+4} I$

$D \xrightarrow{+5} I \xrightarrow{+5} N$

$I \xrightarrow{+6} O \xrightarrow{+6} U$

197. Fill in the blank.

6	5	9	2	7
1	4	3	5	?
8	0	2	8	1

- a. 6 b. 5
c. 3 d. 4

197. d

The missing number is 4—simply add the first and second rows to get the third row

$$\begin{array}{rrrrr} 6 & 5 & 9 & 2 & 7 \\ + & 1 & 4 & 3 & 5 & 4 \\ \hline 8 & 0 & 2 & 8 & 1 \end{array}$$

198. Replace the letter WHAT with numbers, so that sum is corrected.

WHAT

$$\begin{array}{r} \times A \\ \hline 8H5W \end{array}$$

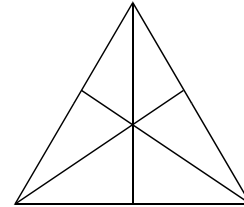
- a. 4027 b. 2740
c. 1236 d. 8054

198. a

$$\begin{array}{r} 4027 \\ \times 2 \\ \hline 8054 \end{array}$$

$$\begin{array}{r} \times 2 \\ \hline 8054 \end{array}$$

199. Find the number of triangles from the given adjoining figure?



- a. 22 b. 20
c. 16 d. 14

199. c

200. Puspa is shorter than Sakshi but much taller than puja. Preety is tallest and Anjali is littler shorter then puspa. Which one is shortest?

- a. Puspa b. Puja
c. Preety d. Anjali

200. b

$$Puja < Anjali < Puspa < Sakshi < Preety$$