meritroot
STRONG ROOTS CREATE MERIT

NEET MOCK TEST-03

Time : 3.00Hrs | **200 MCQs PATTERN** | **Max.Marks.720**

ANSWERS AND SOLUTIONS

PHYSICS

1) **3**	2) **2**	3) **2**	4) **4**	5) **4**	6) **3**	7) **3**	8) **2**	9) **4**	10) **2**
11) **1**	12) **2**	13) **2**	14) **4**	15) **4**	16) **2**	17) **1**	18) **1**	19) **3**	20) **1**
21) **1**	22) **4**	23) **2**	24) **4**	25) **1**	26) **2**	27) **2**	28) **4**	29) **2**	30) **4**
31) **2**	32) **1**	33) **2**	34) **2**	35) **3**	36) **4**	37) **2**	38) **4**	39) **2**	40) **3**
41) **2**	42) **3**	43) **2**	44) **3**	45) **1**	46) **3**	47) **4**	48) **1**	49) **2**	50) **2**

CHEMISTRY

51) **3**	52) **2**	53) **3**	54) **3**	55) **2**	56) **3**	57) **2**	58) **3**	59) **2**	60) **4**
61) **3**	62) **4**	63) **4**	64) **4**	65) **2**	66) **1**	67) **3**	68) **4**	69) **2**	70) **2**
71) **1**	72) **2**	73) **4**	74) **4**	75) **3**	76) **1**	77) **1**	78) **3**	79) **3**	80) **3**
81) **4**	82) **2**	83) **4**	84) **2**	85) **2**	86) **4**	87) **4**	88) **2**	89) **1**	90) **1**
91) **1**	92) **2**	93) **1**	94) **2**	95) **3**	96) **4**	97) **3**	98) **4**	99) **1**	100) **3**

BOTANY

101) **3**	102) **3**	103) **3**	104) **4**	105) **2**	106) **1**	107) **2**	108) **2**	109) **1**	110) **3**
111) **1**	112) **3**	113) **2**	114) **1**	115) **4**	116) **2**	117) **1**	118) **2**	119) **2**	120) **1**
121) **3**	122) **3**	123) **4**	124) **1**	125) **2**	126) **2**	127) **1**	128) **1**	129) **1**	130) **2**
131) **3**	132) **4**	133) **1**	134) **1**	135) **2**	136) **4**	137) **1**	138) **1**	139) **2**	140) **2**
141) **3**	142) **2**	143) **3**	144) **3**	145) **1**	146) **4**	147) **1**	148) **4**	149) **4**	150) **3**

ZOOLOGY

151) **3**	152) **3**	153) **2**	154) **4**	155) **1**	156) **3**	157) **2**	158) **2**	159) **3**	160) **1**
161) **3**	162) **3**	163) **4**	164) **1**	165) **3**	166) **2**	167) **3**	168) **1**	169) **2**	170) **4**
171) **1**	172) **2**	173) **2**	174) **2**	175) **3**	176) **4**	177) **3**	178) **2**	179) **3**	180) **2**
181) **3**	182) **3**	183) **2**	184) **2**	185) **2**	186) **1**	187) **2**	188) **2**	189) **4**	190) **2**
191) **2**	192) **3**	193) **1**	194) **4**	195) **3**	196) **3**	197) **4**	198) **3**	199) **2**	200) **1**

HINTS AND SOLUTIONS

1. $\left[\frac{A}{\mu_0}\right]=\left[\frac{\varepsilon_0 A}{\varepsilon_0\mu_0}\right]=\frac{[\varepsilon_0 A]}{[1/\,speed\ of\ light]^2}$

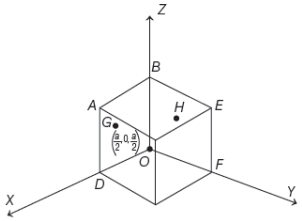
$=\left[ML T^{-4}\right]$ (given)

$[\varepsilon_0 A]=\left[ML^{-1}T^{-2}\right]=\frac{\left[ML^2T^{-2}\right]}{\left[L^3\right]}$

So, $\varepsilon_0 A$ is the energy per volume

Thus A should be E^2.

2. In the given cube, coordinates of point G(centre of face $ABOD$) are $x_1 = \frac{a}{2}, y_1 = 0, z_1 = \frac{a}{2}$ where, a = side of cube



and coordinates of point H are

$x_2 = 0, y_2 = \frac{a}{2}, z_2 = \frac{a}{2}$

So, vector GH is

$GH = (x_2 - x_1)\hat{i} + (y_2 - y_1)\hat{j} + (z_2 - z_1)\hat{k}$

$= -\frac{a}{2}\hat{i} + \frac{a}{2}\hat{j} = \frac{a}{2}(\hat{j} - \hat{i})$

3. Distance will be minimum, when relative speed is zero

$mv = 2mv' \Rightarrow v' = \frac{v}{2}$

$\frac{1}{2}mv^2 + 0 = \frac{1}{2}m\frac{v^2}{4} + \frac{1}{2}m\frac{v^2}{4} + \frac{1}{4\pi\varepsilon_0}\frac{e^2}{r}$

$r = \frac{1}{4\pi\varepsilon_0}\frac{4e^2}{mv^2}$

4. $V_B + 5 - 10i = V_A$

$-10i = 4 - 5 \Rightarrow i = \frac{1}{10}A$

$V_A - 2 - \frac{x}{10} = V_B$

$x = 20\Omega$

5. $V_d = \frac{-e\vec{E}\tau}{m}$; $V_d \propto E$

6. $g' = f\left[1 + \frac{h}{R_e}\right]^{-2}$; $\frac{g}{4} = g\left[1 + \frac{h}{R}\right]^{-2}$

$\left(1 + \frac{h}{R}\right) = 2$; $h = R$

7. $K_{eff} = \frac{2k}{3}, T = 2\pi\sqrt{\frac{3M}{2k}}$

8. $qE = mg$ for drop of radius r

$Q\frac{V}{d} = mg$ -------(1)

For drop of radius 2r

$Q'\frac{V'}{d} = 8mg$ ------(2)

$Q'\frac{3200}{d} = 8Q\frac{600}{d}$; $Q' = \frac{3}{2}Q$

9. $A = \pi r^2 = 3.14 \times (1.2)^2 = 4.5216\,cm^2$

Up to correct significant figures

$A = 4.5\,cm^2$

10. $a = v\frac{dv}{dx}$

11. $h = \frac{u^2\sin^2\theta}{2g} = \frac{u_y^2}{2g} = \frac{4\times4}{2\times10} = 0.8m$

12. Force on B after cutting string

mg = ma

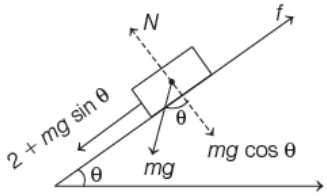
a = g

force on A

3 mg – 2 mg = 2 ma

a = g/2

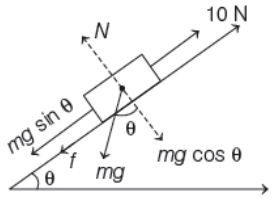
13. Block does not move upto a maximum applied force of 2N down the inclined plane.



So, equating forces, we have;

$2 + mg\sin\theta = f$ or $2 + mg\sin\theta = \mu mg\cos\theta$ .....(i)

Similarly, block also does not move upto a maximum applied force of 10 N up the plane.



Now, equating forces, we have

$mg\sin\theta + f = 10N$ or $mg\sin\theta + \mu mg\cos\theta = 10$ …(ii)

Now, solving Eqs. (i) and (ii), we get

$mg\sin\theta = 4$ ...(iii)

and $\mu mg\cos\theta = 6$ ...(iv)

Dividing, Eqs. (iii) and (iv), we get

$$\mu\cot\theta = \frac{3}{2} \Rightarrow \mu = \frac{3\tan\theta}{2} = \frac{3\tan 30^o}{2}$$

$$\Rightarrow \mu = \frac{\sqrt{3}}{2}$$

14. $x = \frac{t^3}{3} + \frac{t^4}{4}$; $v = \frac{dx}{dt} = t^2 + t^3$

$$w = \Delta K = \frac{1}{2}m\left[v_2^2 - v_0^2\right]$$

$$= \frac{1}{2}\times 5\left[(12)^2 - 0\right] = 360J$$

15. In head on elastic collision of two equal masses

velocity will exchange.

16. $$y_{cm} = \frac{2M\left(\frac{L}{4}\right) + M\left(\frac{3L}{4}\right)}{3M} = \frac{5L}{12}$$

$$x_{cm} = \frac{2M\left(\frac{L}{2}\right) + \frac{ML}{4}}{3M} = \frac{5L}{12}$$

17.

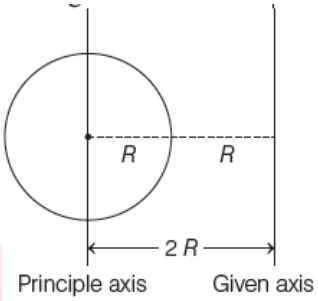
$$v_{max} = \sqrt{rg\left(\frac{\tan\theta + \mu}{1 - \mu\tan\theta}\right)} = \sqrt{10\times 10\left(\frac{1+0.6}{1-0.6}\right)}$$

$$= 20\,m/s$$

18. We know that moment of inertia (MI) about the principle axis of the sphere is given by

$$I_{sphere} = \frac{2}{5}MR^2 \text{ ----------(i)}$$

Using parallel axis theorem, moment of inertia about the given axis in the figure below will be



$$I_1 = \frac{2}{5}MR^2 + M(2R)^2$$

$$I_1 = \frac{22}{5}MR^2 \text{ ----------(ii)}$$

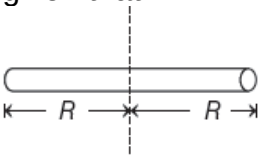
Considering both spheres at equal distance from the axis, moment of inertia due to both spheres about this axis will be

$$2I_1 = 2\times\frac{22}{5}MR^2$$

Now, moment of inertia of rod about its perpendicular bisector axis is given by

$$I_2 = \frac{1}{12}ML^2$$

Here, given that $L = 2R$



$$\therefore I_2 = \frac{1}{12}M(2R)^2 = \frac{1}{3}MR^2 \text{ ----------(iii)}$$

So, total moment of inertia of the system is

$$I = 2I_1 + I_2 = 2\times\frac{22}{5}MR^2 + \frac{1}{3}MR^2$$

$$\Rightarrow I = \left(\frac{44}{5} + \frac{1}{3}\right)MR^2 = \frac{137}{15}MR^2$$

19. Speed of mass, $v=\sqrt{2gh}$

Speed of ring,

$$v^{|}=\sqrt{\frac{2gh}{\left(1+\frac{k^2}{R^2}\right)}}=\sqrt{\frac{2gh}{1+1}}=\frac{v}{\sqrt{2}}$$

20. Apply energy conservation law

$$mg\frac{l}{2}=\frac{1}{2}I\omega^2$$

$$mg\frac{l}{2}=\frac{1}{2}\frac{ml^2}{3}\omega^2\Rightarrow\omega=\sqrt{\frac{3g}{l}}$$

21. $V_R=V_T-V_C$

$V_R=$ Potential due to remaining portion

$V_T=$ Potential due to total sphere

$V_C=$ Potential due to cavity

Radius of cavity is $\frac{R}{2}$.Hence, volume and mass is $\frac{M}{8}$

$$\therefore V_R=-\frac{GM}{R^3}\left[1.5R^2-0.5\left(\frac{R}{2}\right)^2\right]+\frac{G\left(\frac{M}{8}\right)}{\left(\frac{R}{2}\right)}\left(\frac{3}{2}\right)$$

$$=-\frac{GM}{R}$$

22. $T=8s,\omega=\frac{2\pi}{T}=\left(\frac{\pi}{4}\right)rads^{-1}$

$\Rightarrow x=A\sin\omega t$

$$\therefore a=-\omega^2x=-\left(\frac{\pi^2}{16}\right)\sin\left(\frac{\pi}{4}t\right)$$

Substituting $t=\frac{4}{3}s$, we get

$$a=-\left(\frac{\sqrt{3}}{32}\pi^2\right)cms^{-2}$$

23. $$\frac{\Delta l}{l}=\frac{F}{AY}=\frac{10\times12}{2\times10^{-6}\times2\times10^{11}}=3.0\times10^{-4}$$

24. Decrease in surface energy = heat required in vaporisation.

$$S=4\pi r^2$$

$$\therefore dS=2\left(4\pi r\right)dr$$

$$\therefore T\left(dS\right)=L\left(dm\right)$$

$$\therefore T\left(2\right)\left(4\pi r\right)dr=L\left(4\pi r^2dr\right)\rho$$

$$\therefore r=\frac{2T}{\rho L}$$

25. $A\left(P_L-P_U\right)=mg$

$$P_L-P_U=\frac{3\times10^4\times10}{120}=2.5\times10^3\text{ Pascal}$$

26. Average time between two collisions is given by

$$\tau=\frac{1}{\sqrt{2}\pi nv_{rms}d^2}\text{ ----------(i)}$$

Here, n = number of molecules per unit volume $=\frac{N}{V}$ and $v_{rms}=\sqrt{\frac{3RT}{M}}$

Substituting these values in Eq.(i) we have,

$$\tau\propto\frac{V}{\sqrt{T}}\text{ ---------(ii)}$$

For adiabatic process, $TV^{\gamma-1}$=constant substituting in Eq. (ii), we have

$$\tau\propto\frac{V}{\sqrt{\left(\frac{1}{V^{\gamma-1}}\right)}}\text{ or }\tau\propto V^{1+\left(\frac{\gamma-1}{2}\right)}\text{ or }\tau\propto V^{\left(\frac{1+\gamma}{2}\right)}$$

27. $$\frac{Q}{W}=\frac{\Delta U+W}{W}=\frac{\Delta U}{W}+1=\frac{nC_vdT}{nRdT}+1$$

$$\frac{Q}{W}=\frac{R}{(\gamma-1)R}+1=\frac{\gamma}{\gamma-1}$$

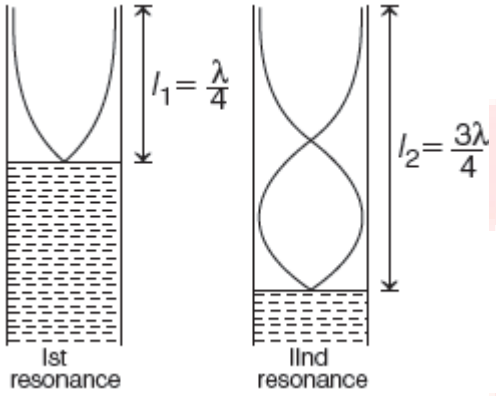
28. $$\eta=\frac{W}{Q_1}=\left(1-\frac{T_2}{T_1}\right)$$

$$W=\left(1-\frac{400}{500}\right)\times6\times10^4=1.2\times10^4cal$$

29. According to wein's law
$\lambda_m T = \text{constant}$
$\frac{CT}{v_{max}}$; $v_m \propto T$

30. $v = \frac{\lambda}{T} = \frac{100}{0.02} = 5000\,cm/s$

31. In a resonance tube apparatus, first and second resonance occur as shown

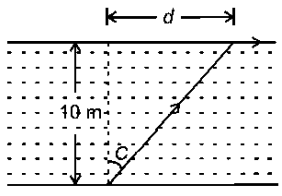


As in a stationary wave, distance between two successive nodes is $\frac{\lambda}{2}$ and distance of a node and an antinode is $\frac{\lambda}{4}$.

$l_2 - l_1 = \frac{3\lambda}{4} - \frac{\lambda}{4} = \frac{\lambda}{2}$

So, speed of sound, $v = f\lambda = f \times 2(l_2 - l_1)$
$= 480 \times 2 \times (70-30) \times 10^{-2} = 384\,ms^{-1}$

32.



$\mu = \frac{1}{\sin C} \Rightarrow \sin C = \frac{1}{\mu} = \frac{1}{\sqrt{2}}$

$C = 45^o$; $\frac{d}{10} = \tan 45^o \Rightarrow d = 10m$

33. $i + e = A + \delta$; $60 + e = 30 + 30$
$e = 0$; As $e = 0, r_2 = 0$
For normal incidence at second face
$r_1 + r_2 = A$; $r_1 = A = 30^o$

$\mu = \frac{\sin i}{\sin r} = \frac{\sin 60^o}{\sin 30^o} = \sqrt{3}$

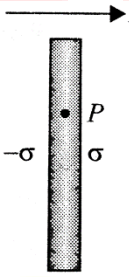
34. $M = \frac{f_0}{f_e}\left(1 + \frac{f_e}{D}\right) = -\frac{200}{5}\left[1 + \frac{5}{25}\right]$
$M = -48$

35. $3\frac{\lambda_1 D}{d} = \frac{4\lambda_2 D}{d}$

$\lambda_2 = \frac{3}{4}\lambda_1 = \frac{3}{4} \times 600 = 450\,nm$

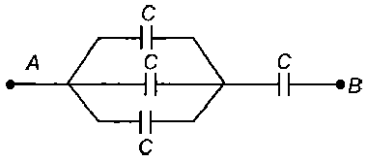
36. $I_2 = \frac{I_2}{2}\cos^2 60^o = \frac{I_0}{8}$

37. Net electric field at point P should be zero, For this electric field due to induced charges = applied electric field



$\Rightarrow \frac{\sigma}{\varepsilon_0} = E \Rightarrow \sigma = \varepsilon_0 E$

38.



$C_{eff} = \frac{3}{4}C = \frac{3}{4} \times 12 \Rightarrow C_{eff} = 9\mu F$

39. $B = B_1 - B_2 = \frac{\mu_0 i}{24}\left(\frac{1}{a} - \frac{1}{b}\right)$

$B = \frac{\mu_0 i}{24}\left(\frac{b-a}{ab}\right)$

40. For diamagnetic materials, $\mu_d = 0$

41. $Z = 30\Omega\ i = \frac{V}{Z} = \frac{240}{30},\ i = 8A$

$V = V_L - V_C = 0$

42. $\lambda = \frac{h}{\sqrt{2mk}}$

43. $A = \frac{200}{2^5} = 6.25g$

44. Current through resistance of 1 kΩ

$i = \frac{25-12}{1\times10^3} = 13mA$

Current through $2k\Omega$,

$i^{|} = \frac{12}{2\times10^3} = 6mA$

Current through zener = 13 – 6 = 7 mA

45. Barrier potential opposes flow of majority carriers in both region.

46. $B2\pi r = \frac{\mu_0 I r^2}{R^2}$

$\therefore B = \frac{\mu_0 I r}{2\pi R^2} = \frac{\mu_0 I}{8\pi}$

47. $\frac{1}{V_0} - \frac{1}{U_0} = \frac{1}{f_0} \qquad \therefore V_0 = 6cm$

$\frac{1}{V_e} - \frac{1}{U_e} = \frac{1}{f_e} \qquad \therefore U_e = -5cm$

$\therefore L = 6 + 5 = 11cm$

48. $d^{'} = \frac{d\cos r}{\cos i}$ and $\mu = \frac{\sin i}{\sin r}$

$\therefore \cos r = \sqrt{\frac{2}{3}}$

49. Answer (2)
When light is incident at polarizing angle. The reflected ray and refracted rays are mutually perpendicular.

50. Instantaneous current $I = 2 + 4\sin\omega t$

$$I_{RMS}^2 = \frac{\int_0^T I^2 dt}{\int_0^T dt} = \frac{\int_0^T (2+4\sin\omega t)^2}{T} dt$$

$$= \frac{\int_0^T \left(4 + 16\sin^2\omega t + 8\sin\omega t\right) dt}{T}$$

$$= \frac{\int_0^T 4dt + \int_0^T 16\sin^2\omega dt + \int_0^T 8\sin\omega dt}{T}$$

$$= \frac{4T + 16\times\frac{T}{2} + 0}{T}$$

$I_{RMS}^2 = 4 + 8 = 12$

$I_{RMS} = \sqrt{12} = 2\sqrt{3}(A)$

Remember $\int_0^T \sin^2\omega t dt = \frac{T}{2}$

$\int_0^T \sin^2\omega t dt = 0$

CHEMISTRY

51.

Molecule	Shape
BCl_3	Trigonal planar
ClF_3	T-Shape
PCl_3	Pyramidal
SF_4	See-Saw

52. $\lambda = \frac{h}{mV} = \frac{6.625\times10^{-34}}{500\times10^{-6}\times100}$

$\lambda = 1.325\times10^{-32}m$

53. The pair of elements which show diagonal relationship are
Li and Mg ; Be and Al ; B and Si

54. *d* subshell contains 5 orbitals.
Maximum number of electrons = 2 × 5 = 10.

55. If bond order is Zero then the species will not exist
Be_2 (8 electrons)

$(\sigma_{1s})^2(\sigma_{1s}^*)^2(\sigma_{2s})^2(\sigma_{2s}^*)^2$

B.O of $Be_2 = \frac{1}{2}(4-4) = 0$

56. Glucose does not form hydrogensulphite addition
product with $NaHSO_3$.

57. The compounds which contain ketomethyl group or which in reaction condition generate ketomethyl group will give positive iodoform test (I_2/NaOH) Acetone and ethanol, both will give positive iodoform test hence this test can not be used to
distinguish them.

58. Rate of diffusion $\propto \frac{1}{\sqrt{M}}$

$$\frac{r_{H_2}}{r_{O_2}} = \sqrt{\frac{M_{O_2}}{M_{H_2}}} = \sqrt{\frac{32}{2}}$$

$$\frac{r_{H_2}}{r_{O_2}} = 4:1$$

59. Higher the intermolecular force of attraction among the molecules easier it is to liquify the
gas. There is H-bonding in NH3.

60. Sodium phenoxide is salt of weak acid and strong base.

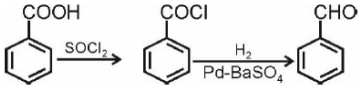
$$pH = 7 + \frac{1}{2}(pK_a + \log C)$$

$$= 7 + \frac{1}{2}(9.95 + \log 0.2)$$

$$= 7 + \frac{1}{2}(9.95 - 0.7) = 11.6$$

61. The species which can donate its lone pair of electrons to an electron deficient species is
called as Lewis base.

62.



63. Tertiary alkyl halide react fastest by S_N^1 mechanism as the carbonium ion formed by the removal of –Br is most stable.

64. $N_2 + 3H_2 \rightarrow 2NH_3$

Mole of N_2 = $= \frac{28}{28} = 1$

Mole of H_2 = $= \frac{10}{2} = 5$

H_2 is present in excess amount therefore N_2 is limiting reagent.

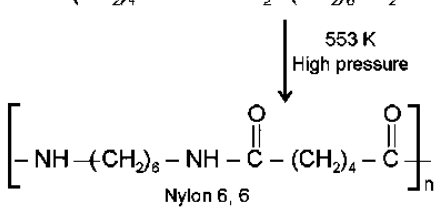
Mole of ammonia produced = 2.

65. Mass of urea = 60 × 5 = 300 g
Mass of water = 1000 g
Mass of solution = 1300 g

$$Mass\ \% = \frac{300}{1300} \times 100 = 23.1\%$$

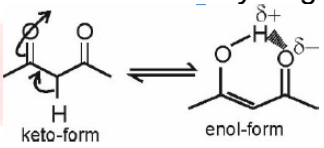
66. Secondary alcohol on reaction with copper gives ketone as major product.

67. Nylon 6, 6 is a condensation polymer



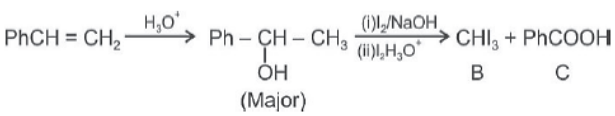
68. In insulin, polypeptides coil around to give spherical shape.

69 Methylene hydrogen present between two carbonyl groups are highly acidic in nature and
the enol formed is stabilised by intramolecular Hydrogen bonding..



70. The cyclic species in which (4n + 2)π electrons are delocalised in the ring (n = 1, 2, 3….)

71.



72. H_3PO_2 is hypo phosphorous acid oxidation state of P in H_3PO_2 is +1.

73. Dissociation constant of H_2Te is highest hence it is the strongest acid among the given options.

74. $4H_3PO_3 \rightarrow 3H_3PO_4 + PH_3$

75. $4Zn+10HNO_3(dilute) \rightarrow 4Zn(NO_3)_2+5H_2O+N_2O$

76. Equanil is used as tranquilizer.

77. Sc3+ does not contain d electron-Hence it is colourless.

78. All *d* electrons of Co in $[Co(C_2O_4)_3]^{3-}$ are paired. Hence it is diamagnetic in nature.

79. According to spectrochemical series the correct order of ligand field strength is
$C\bar{N} > NH_3 > \bar{O}H > I^-$

80. $5C_2O_4^{2-} + 2MnO_4^- + 16H^+ \longrightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$

81. Approximate percentage of lanthanoids in mischmetal is 95%.

82.

Element	**ΔegH kJ mol^{-1}**
O	–141
S	–200
Se	–195
Te	–190

Oxygen being smaller in size experience repulsion on addition of one electron in gaseous state hence electron gain enthalpy is lowest in oxygen.

83. $\Delta T_f = K_f m$

$$= 1.86 \times \frac{\frac{18}{180}}{\frac{250}{1000}} = 1.86 \times \frac{18}{180} \times \frac{1000}{250}$$

$\Delta T_f = 0.74$; freezing point of the solution T_S= –0.74°C

84. Packing fraction $= \frac{2 \times \left(\frac{4}{3}\right)\pi r^3}{\left(\frac{4}{\sqrt{3}}r\right)^3} = \frac{\sqrt{3}}{8}\pi$

85. $\Lambda_m = \frac{1000 \times k}{C} = \frac{1000 \times 0.0015}{0.01}$

$= 150 S\,cm^2\,mol^{-1}$

86. $E^0_{Au^{3+}/Au} = +ve$ hence it will not reduce H^+ ion of acid to hydrogen.

87. The reaction is first order as the unit of rate constant is s^{-1}

$$t = \frac{1}{K} \times 2.303 \log \frac{a}{a-x}$$

$$= \frac{1}{4.606 \times 10^{-3}} \times 2.303 \log \frac{100}{100-90}$$

$$= 0.5 \times 10^3 = 500s$$

88. A Catalyst does not alter Gibbs energy of reaction.

89. As_2S_3 sol is negatively charged hence it will be precipitated by positively charged ion having highest charge.

90. Low boiling metals like Zn and mercury are refined by distillation.

91. Being smaller in size (charge/radius) ratio is high for Mg^{2+} hence hydration enthalpy is high.

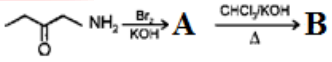
92. $Al_4C_3 + 12D_2O \rightarrow 3CD_4 + 4Al(OD)_3$

93. All carbon are *sp*2 hybridised in graphite.

94. $W_{rev} = -2.303nRT \log \frac{V_f}{V_i}$

$$= -2.303 \times 2 \times 8.314 \times 400 \log \frac{20}{2}$$

$$= -15.3kJ$$

95. 

96. Nylon-6 is made of one type of repeating unit and it is formed by the elimination of H_2O molecule

97. D_2O contains 10 neutrons

$\therefore$ No.of moles $= \frac{10}{20} = \frac{1}{2}$

No. Of electrons $= 10 \times N_A \times \frac{1}{2} = 5N_A$

98. Melting points of Hg, Br_2 Cs and Ga are below 35^0

99. O_2^{2-} has more no. Of antibonding electrons

100. At high pressure
$P(V-nb)=nRT$
$\Rightarrow PV-2Pb=2RT$
$\Rightarrow PV=2(RT+Pb)$

BOTANY

101. Answer (3)
Centrosome is an organelle usually containing two cylindrical structures called centrioles.

102. Answer (3)
Golgi apparatus and ER form the endomembrane system. Hence, their functions are coordinated with each other.

103. Answer (3)
Each centrosome radiates out microtubules called aster. The two asters together with spindle fibres form mitotic apparatus.

104. Answer (4)

105. Answer (2)
Hierarchical arrangement of taxonomic categories in ascending order :
Species→ Genus→ Family→ Order→ Class→ Phylum or Division→ Kingdom

106. Answer (1)
Horsetails belongs to pteriodophytes and sole members of kingdom monera is bacteria.
ICBN – International codes for botanical nomenclature.
ICNB - International codes for nomenclature of bacteria.

107. Answer (2)

108. Answer (2)
Kingdom protists includes diatoms and their walls are embedded with silica and thus walls are indestructible.

109. Answer (1)
Whorled phyllotaxy is seen in *Alstonia*.

110. Answer (3)
Twisted aestivation is seen in china rose.

111. Answer (1)
A tissue is a group of cells having a common origin and usually performs a common function.

112. Answer (3)
Sclerenchyma is usually dead and without protoplast.

113. Answer (2)
In bryophyte, dominant phase is gametophyte.

114. Answer (1)
Marchantia is a bryophyte and its plant body is differentiated into thallus or foliose structure and rhizoids.

115. Answer (4)
Net flow of water is zero between Cell-A and Cell-C.

116. Answer (2)
The loss of solute from the medium produces a high water potential . ()wψ

117. Answer (1)
Ammonia is first stable product of nitrogen fixation.

118. Answer (2)
Dentrification is carried by bacteria *Pseudomonas* and *Thiobacillus* during nitrogen cycle.

119. Answer (2)
Biosynthetic phase does not directly depends on the presence of light but is directly dependent on the product of light reaction, *i.e.,* ATP and NADPH.

120. Answer (1)
The stage of reduction in C3 cycle involves utilisation of 2 molecules of ATP for phosphorylation and two of NADPH for reduction per CO2 fixed. The fixation of 6 molecules of CO2 and 6 turns of cycle are required for removal of one molecule of glucose from the pathway.

121. Answer (3)
In glycolysis, ATP is utilised at two steps : First in conversion of glucose into glucose-6-phosphate and second in the conversion of fructose-6-phosphate to fructose 1,6-bisphosphate.
122. Answer (3)
For each ATP produced, 2H+ passes through F0 from the intermembrane space to the matrix down the electrochemical proton gradient.
123. Answer (4)
Differences in shapes of leaves produced in air and those produced in water in buttercup represent the heterophyllous development due to environment.
124. Answer (1)
125. Answer (2)
Life span of various organisms : Crow – 15 years, Parrot – 140 years, Horse – 60 years, Cow – 20-25 years, Dog – 25-30 years.
126. Answer (2)
Bryophyllum – vegetatively reproduce through leaf.
127. Answer (1)
Non-albuminous seeds have no residual endosperm as it is completely consumed during embryo development. Ex: Pea, ground nut, etc.
128. Answer (1)
129. Answer (1)
In B-DNA model, the rise per base is . One full turn of the helical strand would involve ten steps or ten base pairs, thus the pitch is . 3.4Å34Å
130. Answer (2)
Failure of cytokinesis after telophase stage of cell division results in an increase in whole set of chromosomes in an organisms and, the phenomenon is known as polyploidy.
131. Answer (3)
According to question,
A typical mammalian cell contains 6.6×10^9bp.
Since, a typical nucleosome contains 200 bp of DNA helix (= 2×10^2bp)
Therefore, number of nucleosome
$$= \frac{6.6 \times 10^9 bp}{2 \times 10^2 bp} = 3.3 \times 10^7$$
132. Answer (4)
Chlorophyll is a primary metabolite in plant cell.
133. Answer (1)
In inducible operon system, *i* codes for repressor protein.
134. Answer (1)
135. Answer (2)
Bitter gourd is vitamin 'C' enriched vegetable crop released by IARI, New Delhi. While, spinach, pumpkin and carrot are vitamin 'A' enriched vegetable crops.
136. Answer (4)
Leuconostoc and *Streptococcus* are the bacteria used in making dosa and idli.
137. Answer (1)
Monascus purpureus produces statins.
138. Answer (1)
Disarmed retroviruses are now used to deliver desirable genes into animal cells.
139. Answer (2)
Bt plants make their own insecticidal protein. The activated toxin binds to the surface of midgut epithelial cells and create pores that cause cell swelling and lysis and eventually cause death of the insect.
140. Answer (2)
GM plants have
• More resistance to abiotic stresses
• Decreased reliance on chemical pesticides

• Increased efficiency of mineral usage by plants (this prevents early exhaustion of fertility of soil).

141. Answer (3)
Meloidogyne incognita is a nematode which parasitise the roots of tobacco plants and causes a great reduction in yield.

142. Answer (2)
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143. Answer (3)

144. Answer (3)

145. Answer (1)

146 Answer (4)
Homo sapiens and Panthera leo are species.

147 Answer (1)
The prime source of taxonomic studies of various species of plants, animals and other organisms is collection of actual specimen

148 Answer (4)
Thermoacidophiles are chemoautotrophs.

149 Answer (4)
Pteridophytes are vascular cryptogams.

150 Answer (3)
Embryo sac of flowering plants is 7 celled and 8 nuclei structure.

ZOOLOGY

151. Answer (3)
Aschelminthes (*Ascaris*, *Wuchereria*, *Ancylostoma*) are bilaterally symmetrical and possess false coelom *i.e*, Pseudocoelom.

152. Answer (3)
The body of hemichordates is cylindrical and is composed of an anterior proboscis, a collar and a long trunk. Excretory organ is proboscis gland.

153. Answer (2)
Hisardale is a new breed of sheep developed in Punjab by crossing Bikaneri ewes and Merino rams.

154. Answer (4)
In cephalochordates like *Branchiostoma* (Amphioxus or Lancelet) notochord persists throughout their life. In Urochordates like *Ascidia*, *Salpa* and *Doliolum*, notochord is present only in larval tail.

155. Answer (1)
Tight junctions help to stop substances from leaking across a tissue. Gap junctions facilitate the cells to communicate with each other by connecting the cytoplasm of adjoining cells, for rapid transfer of ions, small molecules and sometimes big molecules. Basement membrane is a delicate non-cellular layer over which the basal surface of epithelial tissue lies.

156. Answer (3)
The smooth muscle fibres do not show striations.

157. Answer (2)
The squamous epithelium is made up of a single thin layer of flattened cells.

158. Answer (2) As both male and female progeny got effected, it is autosomal recessive character.

159. Answer (3) Red algae has phycobilin, hence absurd blue light.

160. Answer (1)

161. Answer (3)
Each tooth is embedded in a socket of jaw bone, this type of attachment is called thecodont.

162. Answer (3)
Sucrase acts on sucrose, maltase on maltose whereas nucleases breakdown nucleic acids into nucleotides.

163. Answer (4)
TLC = IRV + TV + ERV + RV
VC = IRV + TV + ERV

IC = IRV + TV
EC = ERV + TV

164. Answer (1)
Low pO_2, high pCO_2, high H^+ concentration and higher temperature favour dissociation of oxygen from the haemoglobin.

165. Answer (3)
Neutrophils, eosinophils and basophils are granulocytes. Lymphocytes and monocytes are agranulocytes.

166. Answer (2)
The P-wave of ECG represents electrical excitation of the atria. Volume of blood pumped out by each ventricle per cycle is termed as stroke volume and per minute is called cardiac output.

167. Answer (3)
ANF results in vasodilation.

168. Answer (1)
Frog and humans are ureotelic. Pigeon, lizards, cockroach are uricotelic.

169. Answer (2)
Fibrous joints do not allow any movement.

170. Answer (4)
Tetany results due to hypocalcemia.
11th and 12th pair of ribs → Floating ribs.
Pubic symphysis is formed ventrally.

171. Answer (1)
Each half of pectoral girdle consists of a clavicle and a scapula.

172. Answer (2)
Cornea is the anterior portion of sclera. The aperture surrounded by the iris is called the pupil. The diameter of pupil is regulated by the muscle fibres of iris.

173. Answer (2)
The hindbrain comprises pons, cerebellum and medulla. Three major regions make up the brain stem, mid brain, pons and medulla oblongata.

174. Answer (2)
Grave's disease/exophthalmic goitre is a form of hyperthyroidism.

175. Answer (3)
Steroid hormones (e.g, cortisol, testosterone, estradiol and progesterone) and iodothyronines interact with intracellular receptors of target cells.

176. Answer (4)
The body of endoparasite is externally covered with a thick tegument, a protective layer that protects the parasitic worms from the digestive juices of host. Calcareous ossicles are not present.

177. Answer (3)
Diploblastic animals – *Physalia*, *Adamsia*, Sea anemone, *Pennatula*, *Gorgonia*, *Meandrina*
Triploblastic animals – *Fasciola*, *Taenia*, *Ancylostoma*

178. Answer (2)
The most distinctive feature of echinoderms is the presence of water vascular system which helps in locomotion, capture and transport of food and respiration.
Water transport or canal system is seen in poriferans.

179. Answer (3)
Normal cells show a property called contact inhibition by virtue of which contact with other cells inhibits their uncontrolled growth.

180. Answer (2)
Labeo belongs to class Osteichthyes with bony endoskeleton, gills which are covered by an operculum on each side and air bladder which regulates buoyancy.
Carcharodon – Class Chondrichthyes
Hyla – Amphibian
Petromyzon – Class Cyclostomata

181. Answer (3)

Heart is three chambered in chameleon while four chambered in crocodile. *Salamandra* is viviparous tailed amphibian.

182. Answer (3)
Thymus and bone marrow are primary lymphoid organs.

183. Answer (2)
Mushroom gland (in male cockroach) – 6th to 7th abdominal segments.

184. Answer (2)
During fertilisation, a sperm comes in contact with the *zona pellucida* layer of the ovum and induces changes in the membrane that block the entry of additional sperms.

185. Answer (2)
LH surge induces rupture of Graafian follicle and thereby release of ovum (ovulation)

186. Answer (1)
Fertilisation induces the completion of the meiotic division of the secondary oocyte. The fertilisation takes place in the ampullary region of fallopian tube.

187. Answer (2)
Condoms are barriers made of thin rubber/latex sheath that are used to cover the penis in the male or vagina and cervix in the female just before coitus.

188. Answer (2)
Oophorectomy – Removal of ovary/ovaries
Mastectomy – Removal of mammary glands

189. Answer (4)
When more than one adaptive radiation appeared to have occurred in an isolated geographical area (different habitats), one can call this convergent evolution.

190. Answer (2)
Atmosphere of primitive earth was reducing and did not contain oxygen.

191. Answer (2)
The brain capacity of *Homo habilis* was between 650 – 800 cc.

192. Answer (3) Decomposers are essential for nutrient recycling.

193. Answer (1) ACTH, LH, LTH and FSH are secreted by anterior pituitary gland.

194. Answer (4) As tricuspid valve got damaged, some blood flows back into right atrium, hence blood flow into pulmonary artery decreases.

195. Answer (3) Thecodont.

196 Answer (3)
Mast cells and basophils have similar functions.

197 Answer (4)
Geometric growth is also known as exponential growth and curve is J-shaped.

198 Answer (3)
Pollination is a broadly utilitarian ecosystem service.

199 Answer (2)
Pneumonia bacteria grow better at 37°C rather than at 33°C, hence they attack alveoli rather than upper respiratory tract.

200 Answer (1)
Homology is based on divergent evolution. Both the mentioned structures arise from stem.