HINT AND SOLUTIONS

PHYSICS

1. (A)
Gravitational force does not depend on the medium.

2. (B)
Young's modulus of wire does not vary with dimension of wire. It is the property of given material.

3. (C)
$$\text{Energy/volume} = \frac{1}{2}\times 10^{6}\times 10^{-4} = 50\,\text{J.m}^{-3}$$

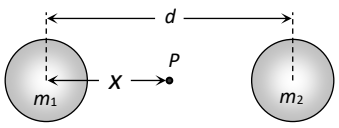
4. (C)
Areal velocity of the planet remains constant. If the areas *A* and *B* are equal then $t_1 = t_2$.

5. (B)
In case of soap bubble
$W = T \times 2 \times \Delta A$
$= 0.03 \times 2 \times 40 \times 10^{-4} = 2.4 \times 10^{-4}$ J.

6. (D)
The block moves up with the fall of coin, *l* decreases, similarly *h* will also decrease because when the coin is in water, it displaces water equal to its own volume only.

7. (C)
$$n\times\frac{4}{3}\pi r^3 = \frac{4}{3}\pi R^3 \ldots\ldots(i)$$
{$\because$ volumes are equal}.
and $\Delta A = -[4\pi R^2 - n.4\pi r^2]$
where $W = (\Delta A) \times T$.
$= -4\pi[n^{2/3}r^2 - n.r^2]\times T = 4\pi r^2 T.n^{2/3}[n^{1/3}-1]$.
Now $R^2 = n^{2/3}.\, r^2$;
So $W = 4\pi R^2 T[n^{1/3} - 1]$

8. (D)



Force will be zero at the point of zero intensity
$$\frac{G(81M)}{x^2} = \frac{GM}{(D-x)^2}$$
$$\Rightarrow \quad x^2 = 81(D-x)^2$$
$$\Rightarrow \quad x = \frac{9D}{10}$$

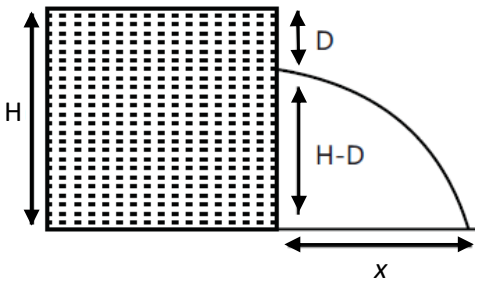
9. (A)
Due to inertia and gravitational force it will continue to move along the original path of the spacecraft.

10. (A)
$A_1V_1 = A_2V_2$
$\pi (10^{-2})^2 V_P = \pi(2\times 10^{-2})^2 V_Q$
$V_P = 4V_Q$

11. (C)
$$g_{moon} = \frac{GM_{moon}}{R_{moon}^2}$$
$$g_{moon} = \frac{G\left(M_{earth}/80\right)}{\left(R_{earth}/4\right)^2}$$
$$\Rightarrow \quad g_{moon} = \frac{1}{5}\frac{GM_{earth}}{R_{earth}} = \frac{g}{5}$$

12. (C)
$$\ell = \frac{FL}{AY} \Rightarrow \ell \propto \frac{L}{d^2}$$
$$\Rightarrow \frac{\ell_1}{\ell_2} = \frac{L_1}{L_2}\times\left(\frac{d_2}{d_1}\right)^2 = \frac{1}{2}\times\left(\frac{1}{2}\right)^2 = \frac{1}{8}$$

13. (A)



Velocity of water = $\sqrt{2Dg}$
Time taken by water to come to the ground
$$t = \sqrt{\frac{2(H-D)}{g}}$$
Distance where water hit the surface = vt
$$\sqrt{2Dg}.\sqrt{\frac{2(H-D)}{g}} = 2\sqrt{D(H-d)}$$

14. (D)
$$F \propto \frac{1}{r^2}$$
If r becomes double then F reduces to $\frac{F}{4}$

15. (B)

16. (B)
$$g' = g\left(1-\frac{d}{R}\right) \Rightarrow \frac{g}{n} = g\left(1-\frac{d}{R}\right) \Rightarrow d = \left(\frac{n-1}{n}\right)R$$

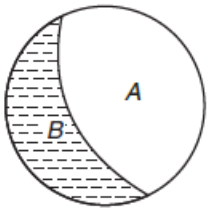
17. (A)

At equator, $g' = g - \omega^2 R \Rightarrow \frac{3g}{5} = g - \omega^2 R$

$\Rightarrow \omega = \sqrt{\frac{2g}{5R}}$

18. (A)

B will have a tendency to keep its area as low as possible.

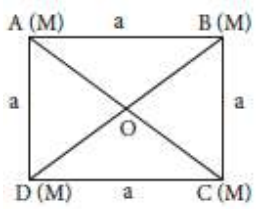


19. (C)

The length of the water column will be equal to full length of capillary tube.

20. (C)

According to the question,



From the above figure,

OA = OB = OC = OD

$= \frac{a\sqrt{2}}{2}$

$= \frac{a}{\sqrt{2}}$

Total gravitational potential at the centre of the square

$= \frac{-Gm \times 4}{OA}$

$= \frac{-4Gm}{a/\sqrt{2}}$

$= \frac{-4\sqrt{2}Gm}{a}$

21. (B)

Potential energy of the 1 kg mass which is placed at the earth surface = $-\frac{GM}{R}$

Its potential energy at infinite = 0

$\therefore$ Work done = change in potential energy = $\frac{GM}{R}$

22. (B)

$h\rho g = 10^5$ Pa(given)

$\therefore p_x = \left(h - \frac{h}{5}\right)\rho g = 0.8h\rho g$

$= 0.8 \times 10^5$ Pa

23. (D)

$U_i = -\frac{GMm}{R}, U_f = \frac{GMm}{R + R/2}$

$KE_i = KE_f = 0$

$\Delta U = U_f - U_i = -\frac{2GMm}{3R} + \frac{GMm}{R}$

$\Delta U = \frac{GMm}{3R}$ As $\frac{GM}{R^2} = g$

$\Delta U = \frac{mgR}{3}$

24. (B)

Let mass of each liquid be M

$\rho = \frac{M}{V} \Rightarrow V = \frac{M}{\rho}$

For a mixture, density = $\frac{\text{total mass}}{\text{total volume}}$

$= \frac{2M}{\frac{M}{1} + \frac{M}{2}} = \frac{4}{3}$

25. (B)

$v = \sqrt{\frac{GM}{R}} \Rightarrow \frac{v_A}{v_B} = \sqrt{\frac{R_B}{R_A}} = \sqrt{\frac{R}{4R}} = \frac{1}{2}$

$\therefore \frac{v_A}{v_B} = \frac{3V}{v_B} = \frac{1}{2} \therefore v_B = 6V$

26. (B)

$v_e = \sqrt{\frac{2GM}{R}}$; $v_e = \sqrt{\frac{2G\left(\rho \times \frac{4}{3}\pi R^3\right)}{R}}$

$v \propto R\sqrt{\rho}$

$\therefore \frac{v_p}{v_e} = \frac{R_p}{R_e} \times \sqrt{\frac{\rho_p}{\rho_e}} = 4 \times \sqrt{9} = 12$

$\Rightarrow v_p = 12 v_e$

27. (B)

If missile launched with escape velocity then it will escape from the gravitational field and at infinity its total energy becomes zero.

But if the velocity of projection is less than escape velocity then sum of energies will be negative. This shows that attractive force is working on the satellite.

28. (D)

In vacuum there is no viscous force to oppose the velocity.

29. (D)

One with higher hysteresis loss is suitable for shock absorber because high hysteresis loss will lead to dampen shocks in an easy manner. One with lower hysteresis loss suitable for tyres because it will have low relaxation time. Area between loop gives amount of hysteresis loss. More area more loss, less area less loss. Therefore, B is suitable for shock absorber and A for tyres.

30. (C)

$A = 0.1 \times 0.1 = 0.01$ m^2, v = 0.1 m/s, $F_v = 0.002$ N

$\eta = 0.01$ poise = $\frac{1}{10} \times .01 = 10^{-3} \frac{Ns}{m^2}$

$F_v = \eta A \frac{dv}{dz}$

$dz = \frac{\eta A\, dv}{F_v} = \frac{10^{-3} \times 0.01 \times 0.1}{0.02} = 5 \times 10^{-4}$ m

Distance between plates = 0.005 m

31. (D)

As we know that,

Poisson's ration $= -\dfrac{\Delta r / r}{\Delta L / L}$

$A = \pi r^2$

$\Rightarrow \quad \dfrac{\Delta A}{A} = 2\dfrac{\Delta r}{r} \qquad \Rightarrow \quad \dfrac{-6}{100} = 2\dfrac{\Delta r}{r}$

$\Rightarrow \quad \dfrac{\Delta r}{r} = \dfrac{-3}{100}$

Now, $0.5 = -\dfrac{(\Delta r / r)}{(\Delta L / L)}$

$\Rightarrow \quad \dfrac{\Delta L}{L} = -\dfrac{(-3/100)}{0.5} = \dfrac{6}{100}$

$\Rightarrow \quad \dfrac{\Delta L}{L} = 6\%$

32. (A)

Given that,

$P = 100 \text{ atm} = 100 \times 10^5 \text{ Nm}^{-2} = 10^7 \text{ Nm}^{-2}$

$\Delta V = (99.5 - 100)L = -0.5 \text{ L}$

$V = 100 \text{ L}$

According to definition of bulk modulus,

$B = -\dfrac{P}{\Delta V / V}$

$\therefore B = -\dfrac{10^7}{-0.5 \times 100}$

$= 2 \times 10^9 \text{ Nm}^{-2}$

33. (C)

Breaking Force $\propto$ Area of cross section of wire (πr^2) If radius of wire is double then breaking force will become four times.

34. (B)

Pressure at bottom of the lake = $P_0 + h\rho g$

Pressure at half the depth of a lake $= P_0 + \dfrac{h}{2}\rho g$

According to given condition

$P_0 + \dfrac{1}{2}h\rho g = \dfrac{2}{3}(P_0 + h\rho g) \Rightarrow \dfrac{1}{3}P_0 = \dfrac{1}{6}h\rho g$

$\Rightarrow h = \dfrac{2P_0}{\rho g} = \dfrac{2 \times 10^5}{10^3 \times 10} = 20m$.

35. (B)

Pressure in a liquid is divided equally so we can say pressure at both the pistons should same

$\Rightarrow \dfrac{F_1}{A_1} = \dfrac{F_2}{A_2}$ $\quad \left\{ \begin{array}{c} \text{where,} \\ F_1 = F \\ A_1 = 10 \text{cm}^2 \\ A_2 = 10 \text{m}^2 = 10 \times 10^4 \text{cm}^2 \\ F_2 = 8000 \text{N} \end{array} \right.$

Substituting values,

$\dfrac{F}{10} = \dfrac{8000}{10 \times 10^4}$

$\Rightarrow F = 0.8 \text{ N}$ $\quad \left\{ \begin{array}{c} \text{Take} \\ g = 10 \text{ m/s}^2 \end{array} \right\}$

36. (C)

$\dfrac{T_1}{T_2} = \left(\dfrac{R_1}{R_2}\right)^{3/2} = \left(\dfrac{R}{4R}\right)^{3/2} \Rightarrow T_2 = 8T_1$

$\Rightarrow \quad T_2 = 8T$ as $T_1 = T$

37. (A)

Loss of weight = upthrust exerted by liquid

$= \rho g V$

38. (C)

From Bernoulli equation

$\dfrac{1}{2}\rho v_1^2 + \rho g h = \dfrac{1}{2}\rho v_2^2$

$\Rightarrow \quad v_2 = \sqrt{v_1^2 + 2gh}$

$\Rightarrow \quad v_2 = \sqrt{1^2 + 2 \times 10 \times 0.15}$

$\Rightarrow \quad v_2 = 2 m/s$

From equation of continuity $A_1v_1 = A_2v_2$

$A_2 = \left(\dfrac{v_1}{v_2}\right) \times A_1 = \left(\dfrac{1}{2}\right) \times 10^{-4} = 5 \times 10^{-5} \text{m}^2$

39. (A)

According to equation of continuity,

$Av = \text{constant}$

Therefore, velocity is maximum at the narrowest part and minimum at the widest part of the pipe.

According to Bernoulli's theorem for a horizontal pipe,

$P + \dfrac{1}{2}\rho v^2 = \text{constant}$

Hence, when a fluid flow across a horizontal pipe of variable area of cross-section its velocity is maximum and pressure is minimum at the narrowest part and vice versa.

40. (C)

$v_t = \dfrac{2}{g}\dfrac{gr^2(\rho_{body} - \rho_{surrounding})}{n}$

$\Rightarrow \quad v_t \propto \dfrac{1}{n}$

41. (D)

At equilibrium, weight of the given block is balanced by force due to surface tension, i.e.,

$2L \cdot S = W$

or $\quad S = \dfrac{W}{2L} = \dfrac{1.5 \times 10^{-2} N}{2 \times 0.3m} = 0.025 \ Nm^{-1}$

42. (A)

$\Delta P = \dfrac{4T}{R} \therefore \Delta P \propto \dfrac{1}{R}$ $\quad (T = \text{constant})$

Hence, the internal pressure of smaller bubble is larger than that of larger bubble.

43. (B)

44. (B)

$h \propto \dfrac{1}{r}$

$\dfrac{r_1}{r_2} = \dfrac{h_2}{h_1} = \dfrac{66}{22} = \dfrac{3}{1}$

45. (B)

Modulus of rigidity

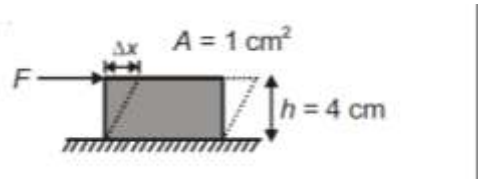
$$(G) = \frac{\text{Force} \times \text{Length}}{\text{Area} \times \text{Lateral displacement}} = \frac{FL}{A \times \Delta x}$$

$F = 10\ kN = 10 \times 10^3\ N$

$L = 4\ cm = 0.04\ m$

$A = 1\ cm^2 = 1 \times 10^{-4}\ m^2$

$G = 8 \times 10^{11}\ N/m^2$



Substituting values

$$8 \times 10^{11} = \frac{10 \times 10^3 \times 0.04}{1 \times 10^{-4} \times \Delta x}$$

$$\Delta x = \frac{10 \times 10^3 \times 0.04}{1 \times 10^{-4} \times 8 \times 10^{11}} = 5 \times 10^{-6}\ m$$

CHEMISTRY

46. (B)

Volume, area and length are extensive properties

47. (B)

First law of thermodynamics

$\Delta U = q + W$

Isothermal expansion $\Delta U = 0$.

48. (D)

Adiabatic process, $q = 0$

Free expansion, $W = 0$

$\Delta U = q + W$

$\Delta U = 0$

$nC_v\ \Delta T = 0$

$\Delta T = 0$

49. (D)

For spontaneous process

$\Delta G = \Delta H - T\Delta S < 0$

50. (B)

$\Delta H = \Delta U + P\Delta V$

$$-124 = \Delta U + \frac{1520}{760} \times (177 - 377) \times 10^{-3} \times 101.3$$

$\Delta U = -83.48\ J$

51. (B)

$\Delta H = \Delta U + \Delta ngRT$

$$82.8 = \Delta U + \frac{1 \times 8.314 \times 298}{1000}$$

$\Delta U = 80.32\ kJ$

52. (A)

Because at Room temperature and 1 bar pressure phosphorous exist in $P_{4(s)}$ form.

53. (A)

Moles of $NH_3 = \frac{34}{17} = 2$ moles

Amount of heat required to decompose 34 gm (2 mole)

$NH_3 = -2 \times \Delta H_f^o = 183.6\ kH$

54. (C)

$$\text{Solid} \xrightarrow{\Delta H_{\text{sublimation}}} \text{Gas}$$

55. (C)

$C_{(s)} + 2H_{2(g)} \longrightarrow CH_{4(g)}$

$\Delta H_f = -(-x) + 2 \times (-z) + 1 \times (-y)$

$= x - y - 2z$

56. (A)

$\Delta H_{reaction} = \Delta H_{C \equiv C} + 2\Delta H_{C-H} + 2\Delta H_{H-H} - (\Delta H_{C-C} + 6\Delta H_{C-H})$

57. (B)

$2H^+ + 2OH^- \longrightarrow 2H_2O$

$\Delta H_{evolved} = 2 \times 57.3\ kJ$

58. (B)

$$T_{m.p.} = \frac{\Delta H_{fusion}}{\Delta S_{fusion}}$$

59. (A)

$C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$

$\Delta H = X = 131 \times 1 + (-282 \times 1) + (-242 \times 1)$

$X = -393\ kJ$

60. (A)

Informative

61. **(A)**

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

$\therefore$ Ratio = $\frac{n_{H_2}}{n_{O_2}} = \frac{1.87/2}{5.53/32} = \frac{1.87 \times 32}{5.53 \times 2} = 5.4$

62. **(B)**

$V_2 = V + \frac{30V}{100} = 1.3V$

$\frac{V_1}{T_1} = \frac{V_2}{T_2}$, So, $\frac{T_2}{T_1} = \frac{1.3V}{V} = 1.3$

$\therefore \quad T_2 = 1.3T_1$

Increase in temperature = $T_2 - T_1$

$= 1.3T_1 - T = 0.3\ T_1$

Percentage increase = $\frac{0.3T_1}{T_1} \times \frac{100}{1} = 30\%$

63. **(A)**

Conceptual

64. **(A)**

$P = \frac{dRT}{M}$

$\frac{d_1}{d_2} = \frac{M_1}{M_2}$

$\Rightarrow \quad \frac{d_1}{d_2} = \frac{44}{44} = 1:1$

65. **(A)**

Conceptual

66. **(D)**

In Charle's law, amount of gas and pressure of gas will be constant.

67. **(C)**

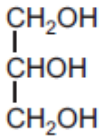
$\frac{r_{H_2}}{r_{HC}} = \sqrt{\frac{12n + 2n - 2}{2}} = \frac{3\sqrt{3}}{1}$

$14n - 2 = 54$

$14n = 56$

$n = 4$

68. **(B)**

Most H-bonded, 

69. **(A)**

$V_{rms} = \sqrt{\frac{3RT}{M}}$

70. **(B)**

$n_1T_1 = n_2T_2$

71. **(B)**

$P_1V_1 = P_2V_2$

72. **(C)**

Conceptual

73. **(B)**

Conceptual

74. **(C)**

$P_{H_2} = \frac{n_{H_2}}{n_T} \times P_{total}$

75. **(B)**

$n_1 + n_2 = n_{total}$

76. **(C)**

Informative

77. **(B)**

Diffusion $\propto \frac{1}{\sqrt{M}}$

78. **(B)**

Informative

79. **(D)**

Real gas equation (for n moles) = $\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$

80. **(D)**

Real gases don't obey ideal gas equation.

81. **(B)**

For adiabatic process q = 0.

82. **(A)**

For isochoric process $\Delta V = 0$

83. **(B)**

$\Delta H = \Delta U + \Delta n_g RT$

84. **(B)**

Second law of thermodynamics.

85. **(D)**

$\Delta G = \Delta H - T\Delta S$

86. **(C)**

Theory based.

87. **(B)**

Theory based

88. **(C)**

$CH_3OH + \frac{3}{2}O_2 \longrightarrow CO_2 + 2H_2O$; $\Delta H = -723$ kJ

With 1 mole of O_2

$\Delta H = -\frac{2}{3} \times 723 = -482$ kJ

89. **(A)**

Combustion is always exothermic

90. **(C)**

Enthalpy of neutralisation of weak acid/base < 57.2 kJ/mol

BIOLOGY

91. (D)
Being photosynthetic, Euglenoid has chloroplast. Euglenoid lacks cell wall but has proteinaceous pellicle. It also has contractile vacuole.

92. (D)
Out of five kingdoms only Monera lacks true sexual reproduction. And Protista is considered as ancestor of multicellular eukaryotic kingdoms.

93. (D)
Alternaria reproduces asexually by conidia which are exogenous.

94. (D)
Penicillium is an ascomycetes which form ascospore during sexual reproduction

95. (B)
In prokaryotes respiratory enzymes are associated with mesosome.

96. (C)
Among these the non-photosynthetic organisms are slime moulds, amoeba, ciliates, zooflagellates.

97. (B)
In phycomycetes the hyphae are multinucleate and called coenocytic.

98. (D)
In ascomycetes and basidiomycetes plasmogamy is not immediately followed by karyogamy. Hence, we can see dikaryon and dikaryotic phase in them.

99. (C)
Ascomycetes are mostly multicellular. Unicellular ascomycetes include yeasts like Saccharomyces

100. (D)
Mushrooms, bracket fungi, puffballs are examples of basidiomycetes.

101. (D)
In basidium karyogamy and meiosis produces 4 basidiospores.

102. (D)
Rhizopus, a member of phycomycetes, produces endogenous asexual spore like aplanospore.

103. (A)
Saxitoxin are toxin produced by Gonyaulax which causes death of marine animals

104. (B)
Thick and tough glycocalyx is called capsule while glycocalyx which forms loose sheath is slime layer.

105. (B)
Nitrogenase enzyme present in heterocyst of some cyanobacteria helps in nitrogen fixation.

106. (C)
Bacterial flagella are made of flagellin proteins.

107. (D)
Lichens, virus, viroid are not considered in five kingdom classification.

108. (C)
Viroid was discovered by T O Diener in 1971

109. (B)
Bacteriophages generally have ds DNA as genetic material.

110. (C)
Being prokaryotes, Mycoplasma have 70S Ribosomes.

111. (A)
Diatoms, dinoflagellates and Mycoplasma are unicellular.

112. (C)
Most members of prokaryotes are heterotrophic in nature.

113. (C)
The chl-a of BGA is similar to that of higher green plants.

114. (D)
Claviceps and morels belong to ascomycetes while Agaricus belongs to basidiomycetes.

115. (A)
Parenchyma undergoes dedifferentiation in tissue culture. Meristem loses its ability to divide upon redifferentiation. Epidermis is formed by differentiation.

116. (B)
In wound healing the primary permanent tissues undergo dedifferentiation to become meristematic in order to heal the wound.

117. (D)
Plasticity is the ability by which plants follow different pathways in response to environment or phases of life to form different types of structures.

118. (C)
Terpenes – GA

119. (D)
Triple response assay is done for ethylene.

120. (C)
Sprouting of potato is promoted by ethylene.

121. (B)
In mid-1960s three independent researchers reported discovery of chemically identical inhibitors called ABA.

122. (C)
Winter cereals show vernalization. They are planted in autumn and they flower in summer.

123. (B)
GA promotes seed germination.

124. (B)
GA promotes seed germination by stimulating the production of hydrolytic enzymes like amylase.

125. (D)
In buttercup the nature of leaf depends whether the plant is in terrestrial habitat or aquatic habitat.

126. (A)
Growth regulators and genomic control come under internal factors that affect plant growth and development.

127. (D)
In plants development includes differentiation , redifferentiation , dedifferentiation

128. (A)
The ability of plants to follow different pathway or phases of life to form different structures in response to environment is called plasticity. For example heterophylly in buttercup.

129. (B)
Geometric growth plotted against time gives a sigmoid curve.

130. (D)
Delay senescence by GA allows fruits to be left on the tree longer, so as to increase the market period.

131. (D)
During photoperiodism a hypothetical hormone florigen migrates from leaves to shoot apices for inducing flowering only when the plants are exposed to the necessary inductive photoperiod

132. (A)
NAA and 2,4- D are synthetic auxins.

133. (D)
Removal of the apical bud of the main shoot and the branches releases apical dominance and allows the lateral branches to grow.

134. (D)
Florigen, Vernalin are hypothetical hormones

135. (B)
For flowering in long day plants light period (photoperiod) should be greater than the critical period

136. (A)
NCERT 11, Pg-297
A fall in glomerular blood flow/glomerular blood pressure/GFR can activate the JG cells to release renin which converts angiotensinogen in blood to angiotensin I and further to angiotensin II.

137. (B)
NCERT 11, Pg-298
Presence of glucose (Glycosuria) and ketone bodies (Ketonuria) in urine are indicative of diabetes mellitus.

138. (B)
NCERT 11, Pg-297
Angiotensin II, being a powerful vasoconstrictor, increases the glomerular blood pressure and thereby GFR.

139. (D)
NCERT 11, Pg-291
Protonephridia or flame cells are the excretory structures in Platyhelminthes (Flatworms, e.g., Planaria), rotifers, some annelids and the cephalochordate – Amphioxus.

140. (B)
NCERT 11, Pg-291
Antennal glands or green glands perform the excretory function in crustaceans like prawns.

141. (C)
NCERT 11, Pg-291
The cortex extends in between the medullary pyramids as renal columns called Columns of Bertini.

142. (A)
NCERT 11, Pg-294
Nearly all of the essential nutrients, and 70-80 per cent of electrolytes and water are reabsorbed by PCT.

143. (A)
NCERT 11, Pg-297
ANF mechanism, acts as a check on the renin-angiotensin mechanism. An increase in blood flow to the atria of the heart can cause the release of ANF. ANF can cause vasodilation and thereby decrease the blood pressure. It inhibits reabsorption of Na+ by Collecting duct and reduces release of aldosterone from adrenal gland.

144. (B)
NCERT 11, Pg-292, 293
Glomerulus alongwith Bowman's capsule, is called the malpighian body or renal corpuscle. The efferent arteriole emerging from the glomerulus forms a fine capillary network around the renal tubule called the peritubular capillaries. A minute vessel of this network runs parallel to the Henle's loop forming a 'U' shaped vasa recta.

145. (C)
NCERT 11, Pg-292
Blood is filtered so finely through renal corpuscle, that almost all the constituents of the plasma except the proteins pass onto the lumen of the Bowman's capsule.

146. (D)
NCERT 11, Pg-296
An increasing osmolarity towards the inner medullary interstitium, i.e., from 300 mOs mol L^{-1} in the cortex to about 1200 mOsmolL^{-1} in the inner medulla. This gradient is mainly caused by NaCl and urea.

147. (B)
NCERT 11, Pg-290
Ammonia is the most toxic form and requires large amount of water for its elimination.

148. (C)
NCERT 11, Pg-298
Liver, the largest gland in our body, secretes bile-containing substances like bilirubin, biliverdin, cholesterol, degraded steroid hormones, vitamins and drugs. Most of these substances ultimately pass out along with digestive wastes.

149. (B)
NCERT 11, Pg-299
Renal calculi: Stone or insoluble mass of crystallised salts (oxalates,etc.) formed within the kidney.

150. (B)
NCERT 11, Pg-291
The cortex extends in between the medullary pyramids as renal columns called Columns of Bertini.

151. (C)
NCERT 11, Pg-297
The signal for micturition is initiated by the stretching of the urinary bladder as it gets filled with urine. In response, the stretch receptors on the walls of the bladder send signals to the CNS. The CNS passes on motor messages to initiate the contraction of smooth muscles of the bladder and simultaneous relaxation of the urethral sphincter causing the release of urine.

152. (D)
NCERT 11, Pg-295
The flow of blood through the two limbs of vasa recta is also in a counter current pattern.

153. (A)
NCERT 11, Pg-293
Collecting duct, many of which converge and open into the renal pelvis through medullary pyramids in the calyces.

154. (C)
NCERT 11, Pg-294
70-80 % of electrolytes and water are reabsorbed by PCT. In tubular reabsorption, nitrogenous wastes are absorbed by passive transport. When the concentrated filtrate passes upward in ascending limb, it gets diluted due to the passage of electrolytes to the medullary fluid.

155. (C)
NCERT 11, Pg-293
The epithelial cells of Bowman's capsule called podocytes.

156. (D)
NCERT 11, Pg-290
Ammonia, as it is readily soluble, is generally excreted by diffusion across body surfaces or through gill surfaces (in fish) as ammonium ions.

157. (A)
NCERT 11,
Excretion is a continuous process but urine is not passed out continuously as it is stored in urinary bladder until micturition reflex.

158. (C)
NCERT 11, Pg-298
The urine formed is a light yellow coloured watery fluid which is slightly acidic (pH-6.0) and has a characterestic odour.

159. (B)
NCERT 11, Pg-305
The thick filaments in the 'A' band are also held together in the middle of this band by a thin fibrous membrane called 'M' line.

160. (C)
NCERT 11, Pg-307
A new ATP binds to meromyosin and the cross-bridge is broken.

161. (C)
NCERT 11, Pg-308
Red muscle fibres (aerobic muscles) have high content of myoglobin, less sarcoplasmic reticulum and plenty of mitochondria.

162. (A)
NCERT 11, Pg-312
Tetany: Rapid spasms (wild contractions) in muscle due to low Ca++ in body fluid.

163. (A)
NCERT 11, Pg-305
I-Band = Tropomyosin, Troponin, F-actin
H-zone = Meromyosin

164. (C)
NCERT 11, Pg-312
Fibrous joint is shown by the flat skull bones which fuse end-to-end with the help of dense fibrous connective tissues in the form of sutures, to form the cranium.

165. (A)
NCERT 11, Pg-303
Cytoskeletal elements like microfilaments are also involved in amoeboid movement.

166. (C)
NCERT 11, Pg-304
Skeletal muscle fibre is lined by the plasma membrane called sarcolemma enclosing the sarcoplasm.

167. (C)
NCERT 11, Pg-310
Last 2 pairs (11^{th} and 12^{th}) of ribs are not connected ventrally and are therefore, called floating ribs

168. (D)
NCERT 11, Pg-312
Ball and socket joint (between humerus and pectoral girdle)

169. (B)
NCERT 11, Pg-310
Sternum is a flat bone on the ventral midline of thorax.

170. (B)
NCERT 11, Pg-310,311
8^{th} ,9^{th} and 10^{th} pairs of ribs are called vertebrochondral (false) ribs. Each half of pectoral girdle consists of a clavicle and a scapula. Sacral vertebra (1-fused) in adults.

171. (A)
NCERT 11, Pg-312
The joint between the adjacent vertebrae in the vertebral column is cartilaginous joint and it permits limited movements.

172. (B)
NCERT 11, Pg-312
Osteoporosis: Age-related disorder characterised by decreased bone mass and increased chances of fractures. Decreased levels of estrogen is a common cause.

173. (A)
NCERT 11, Pg-309
A single U-shaped bone called hyoid is present at the base of the buccal cavity and it is also included in the skull.

174. (B)
NCERT 11, Pg-304
Sarcoplasmic reticulum of the muscle fibres is the store house of calcium ions.

175. (A)
NCERT 11, Pg-303
About 40-50 per cent of the body weight of a human adult is contributed by muscles.

176. (A)
NCERT 11, Pg-311
Scapula is a large triangular flat bone situated in the dorsal part of the thorax between the second and the seventh ribs.

177. (C)
NCERT 11, Pg-311
A cup shaped bone called patella cover the knee ventrally (knee cap).

178. (B)
NCERT 11, Pg-306
sliding filament theory states that contraction of a muscle fibre takes place by the sliding of the thin filaments over the thick filaments

179. (C)
NCERT 11, Pg-312
Myasthenia gravis: Auto immune disorder affecting neuromuscular junction leading to fatigue, weakening and paralysis of skeletal muscle.

180. (A)
NCERT 11, Pg-311
Each coxal bone is formed by the fusion of three bones – ilium, ischium and pubis.