MC SQUARE EDUCATION PVT.LTD

PAPER-03

DATE-30/02/2017

NEET 2017 FINAL TEST SERIES

TOTAL MARK: 720

SR.NO	STUDENT NAME	CHEMISTRY		PHYSICS		BIOLOGY		TOTAL MARKS
1	ADWAIT GOKHALE	25	11	28	7	71	17	461
2	RUTUJA VETHEKAR	4	16	1	7	9	14	19
3	JOSHNA CHOUDHARI	12	5	13	5	61	18	316
4	VARUN BELORIA							
5	MAMTA RAJAWAT	15	11	2	7	33	40	142
6	AKSHATA SHINDE							
7	RIDDHI RAUT	12	10	9	10	42	35	197
8	ARUNDHATI GOTEKAR	10	18	10	16	45	38	188
9	KOMAL SABBANI	12	15	7	10	50	28	223
10	SHREYA PAREKH	00	00	00	00	00	00	ABSENT
11	POOJA UPASE	6	7	4	9	55	25	219
12	ADITYA SASANE	6	10	9	4	61	20	270
13	RUTUJA SASANE	7	7	6	10	40	30	165
14	VIVEK RATHORE	00	00	00	00	00	00	ABSENT
15	SONAM SINGH	12	18	1	4	43	23	179
16	WAJID RAY							
17	RUSHIKESH GHUTUGADE	9	12	9	5	38	24	183
18	SUMIT BORA	21	20	22	16	67	21	383
19	ROHAN PAWAR	18	16	8	14	49	26	244
20	PAWAN KHAMKAR	24	15	3	4	57	25	292
21	SUMIT KAMBLE	20	13	3	4	59	21	290
22	SHIVANI SINGH	10	17	0	2	60	16	245
23	VAIBHAV INGOLE	12	25	6	26	24	43	74
24	RENUKA KATTIMANI	11	18	5	20	39	47	135
25	HARSHA SHINDE	14	21	2	6	55	29	228
26	PAYAL MANE	2	0	3	2	29	10	124
27	AMRUTA MULE	9	15	2	12	21	38	63
28	SHRUTI BARVE	25	5	23	7	66	14	430
29	SIMRAN GURUBAXANI							
30	SAYALI JADHAV	16	15	14	10	54	28	283
31	AYUSHEE AGARWAL	5	7	4	7	43	28	166
32	ANKITA NIMMALWAR	14	6	8	4	59	23	291
33	SNEHA LOKHANDE	8	14	7	9	48	25	204
34	NEHA CHAVAN	5	12	1	6	23	16	82
35	HIMALI CHOUDHARI	12	24	3	21	30	48	87
36	SUMIT SAWANT	19	24	20	12	49	39	277
37	MANALI UBHEDAL	11	11	5	8	50	9	236
38	ANAM PANSARE	8	20	8	17	40	42	145
39	PURVA SHEDGE	15	13	23	10	64	21	364
40	ANJALI SOLANKE							
41	AISHWARIYA NALANAGLU	15	8	3	2	51	18	248
42	AKASHA SANER							
43	SHUBHAM MANE							
44	AMRUTA BHOSALE	7	3	1	2	35	5	162
45	MANASI KASHID	10	7	14	8	22	21	148
46	HARSHADA JADHAV	10	23	7	17	34	34	130
47	RUSHIKESH AWATE	15	23	9	19	31	29	149
48	DIPALI GAIKWAD	7	9	3	8	30	17	126
49	PRITI BIRADAR	12	1	5	4	48	15	240
50	SHEFALI RATHOD	5	8	14	7	38	20	193
51	AISHWARYA BORHADE							
52	NADEEM SHIKALGAR	14	31	13	32	22	68	65
53	RASHMI GAIKWAD	00	00	00	00	00	00	ABSENT
54	YASH RAGHUWANSHI	00	00	00	00	00	00	ABSENT
55	AVINASH CHENDAKE							
56	RUTUJA GHUTUGADE	17	14	12	9	55	31	282
57	NIRAJ PATIL	00	00	00	00	00	00	ABSENT
58	KETAN MORE	00	00	00	00	00	00	ABSENT
59	MADHAVI KATRE	11	32	13	18	43	41	177

SR.NO	STUDENT NAME	CHEMISTRY		PHYSICS		BIOLOGY		TOTAL MARKS
60	KETAKI SHINDE	9	9	4	10	16	23	74
61	SONAM BENDRE	9	10	3	10	13	35	45
62	AKASH BAGADE							
63	RAHUL DESHOTWOD	5	14	2	2	30	30	102
64	ASHWINI PATEL	8	18	5	2	44	30	178
65	KANCHAN JAISWAL	15	10	11	5	53	29	272
66	SAMRAGGI HATI	8	8	8	9	38	21	178
67	SONAL KAMBLE	3	10	2	2	36	32	120
68	PRANALI GAIKWAD	5	16	2	6	42	29	145
69	VIJAYA DHUMAL	25	7	23	4	68	10	443
70	DIPTI GURAV	23	14	26	8	59	21	389
71	AKASH BHISE							
72	SHABNAM BANU							
73	AMRITESH	22	9	13	12	60	26	333
74								
75								
76								
77								

NEET
TEST-3-SOLUTIONS

STANDARD ANSWER KEY											
Q	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
A	D	D	D	B	C	D	D	B	C	C	C
Q	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
A	B	C	D	A	A	A	D	C	A	A	D
Q	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**
A	C	C	C	A	C	B	B	C	D	C	B
Q	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**
A	B	B	A	D	D	C	B	D	A	D	A
Q	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**
A	A	A	C	C	C	B	D	C	D	D	D
Q	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**
A	B	A	C	C	A	C	C	D	A	A	C
Q	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**	**76**	**77**
A	D	D	B	C	A	A	D	B	C	D	C
Q	**78**	**79**	**80**	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**
A	D	A	A	B	D	C	B	D	D	D	D
Q	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**
A	B	C	C	D	A	C	D	B	D	B	A
Q	**100**	**101**	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**
A	C	D	A	D	D	C	D	D	C	C	C
Q	**111**	**112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**	**121**
A	A	D	B	D	A	D	C	B	A	D	C
Q	**122**	**123**	**124**	**125**	**126**	**127**	**128**	**129**	**130**	**131**	**132**
A	A	D	B	D	D	C	D	C	B	B	A
Q	**133**	**134**	**135**	**136**	**137**	**138**	**139**	**140**	**141**	**142**	**143**
A	A	B	C	D	B	A	B	B	A	C	D
Q	**144**	**145**	**146**	**147**	**148**	**149**	**150**	**151**	**152**	**153**	**154**
A	D	D	B	A	D	B	A	A	A	A	B
Q	**155**	**156**	**157**	**158**	**159**	**160**	**161**	**162**	**163**	**164**	**165**
A	A	C	A	A	A	B	B	A	C	C	A
Q	**166**	**167**	**168**	**169**	**170**	**171**	**172**	**173**	**174**	**175**	**176**
A	B	D	B	B	D	D	C	D	C	D	B
Q	**177**	**178**	**179**	**180**							
A	D	C	A	D							

(1) **(D).** Notice that all five atoms/ions are isoelectronic; they all have 18 electrons and a valence shell electron configuration of $3s^2 3p^6$. We know that electrons will be more tightly held with higher (positive) nuclear charge. Therefore, Ca^{2+} will be the smallest ion in the series, and S^{2-} will be the largest.

(2) **(D).** Notice that there is a large increase in ionization energy between the second and third ionizations. This implies that the atom has obtained noble gas configuration for the M^{2+} species. In other words, the atom in question must be choice (D), Ca, which lies in group II of the periodic table. The electron configuration of Ca^{2+} is $1s^2 2s^2 2p^6 3s^2 3p^6$. Choice (A) is incorrect since we would expect Ne, a noble gas, to have a significant first ionization. Choice (B) is incorrect since Li has a noble gas configuration in the Li^+ state and would therefore be expected to have a large second ionization energy. Choice (C) is incorrect since I is a halogen and therefore will obtain a filled p orbital by adding electrons, not subtracting them.

(3) **(D).** Choice (D) is correct since atomic radius decreases across a period but increases as you move down a group. Therefore, Rb will have the largest atomic radius of the atoms listed.

(4) **(B).** Choice (B) is correct. Since Ar is a noble gas with a filled p orbital in its outer shell, it will have special stability and therefore the highest first ionization energy of those atoms listed.

(5) **(C).** The intermolecular attraction in each case results from a dipole-dipole interaction, but only H_2O can participate in hydrogen bonding. Therefore, H_2O will have the highest boiling point.

(6) **(D).** As one goes down the periodic table, the covalent (or atomic) radius of an element increases. Electrons are added to larger orbitals that are further away from the nucleus, which is why the size of atom increases as one goes down the periodic table. The radius changes incrementally as orbits are added but does not increase exponentially over the scale of the periodic table.

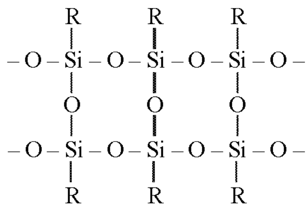
(7) **(D).** Alkali metals (sodium, lithium, etc.) always adopt an oxidation state of +1 and are strongly electropositive. Halogens normally form –1 ions and are strongly electronegative. These factors result in 1 : 1 compound between alkali and halogen elements. Amalgams do not form between these elements.

(8) **(B).**

(9) **(C).** Stability of superoxides increases with increase in size and electro positivity of the metal. Hence the order

$$CsO_2 > RbO_2 > KO_2.$$

(10) **(C).** Silicones are organic silicon polymers containing Si-O-Si linkages.



(Cross linked silicone)

(11) **(C).** $r_{ionic} \propto \frac{1}{Z_{eff}}$

(12) **(B).** Since the phosphate of a metal is $MHPO_4$, therefore, metal M must be divalent, i.e., M^{2+}. As a result, the formula of its chloride is MCl_2.

(13) **(C).** $\underset{100mL}{2H_2O_2} \longrightarrow 2H_2O + \underset{1000mL}{O_2}$

or I mL of H_2O_2 will give 10 mL of O_2 at STP. Thus its volume strength is 10 volume.

(14) **(D).** None of these acids evolve H_2 gas with alkali metals.

(15) **(A).** $I_2(s) + H_2O_2(aq) + 2OH^-(aq) \rightarrow 2I^-(aq) + 2H_2O(l) + O_2(g)$

(16) **(A).** CsCl is not hygroscopic in nature while $MgCl_2$, $CaCl_2$ and LiCl are hygroscopic in nature.

(17) **(A).** The oxidation of sodium borohydride with iodine in diglyme gives diborane.

$$2NaBH_4 + I_2 \xrightarrow{\text{Diglyme}} B_2H_6 + 2NaI + H_2$$

(18) **(D).** Fullerene consists of 12 five-membered rings and 20 six-membered rings. So it has five membered rings less than six membered rings.

(19) **(C).** $2NaOH + 2Al + 2H_2O \rightarrow 2NaAlO_2 + 3H_2$

$\underset{\text{(molten)}}{6NaOH} + 2C \rightarrow 2Na_2CO_3 + 3H_2\uparrow + 2Na$

$Zn + 2NaOH \rightarrow Na_2ZnO_2 + H_2$

Thus, F_2 does not give hydrogen gas with conc. NaOH.

(20) **(A).** $C + 4HNO_3 \rightarrow CO_2 + 4NO_2 + 2H_2O$

$6NaOH + 2C \rightarrow 2Na_2CO_3 + 3H_2 + 2Na$

$SnO_2 + 2C \rightarrow Sn + CO\uparrow$

$Fe_2O_3 + 3C \xrightarrow{250-400°C} 2Fe + 3CO$

Thus, CO_2 is obtained as a product when C reacts with nitric acid.

(21) **(A).** On descending a group, the atoms and ions increase in size. On moving from left to right the size decreases. Thus on moving diagonally the size remains nearly the same. They also have nearly same polarising powers on account of nearly same charge to size ratio.

(22) **(D).** When n = 4, the configuration will be $[Ar]^{18}\ 3d^1\ 4s^2$ and thus period is fourth and group no. is third.

(23) **(C).** K^+ has more number of shells than Mg^{2+} and Al^{3+}. Al^{3+} and Mg^{2+} are isoelectronic but Al^{3+} has higher nuclear charge so $Al^{3+} < Mg^{2+}$. Mg^{2+} and Li^+ has diagonal relationship. But due to +2 charge in Mg^{2+}, the Mg^{2+} is smaller than Li^+. Hence Al^{3+} is the smallest one. $K^+ = 1.38$ Å, $Li^+ = 0.76$ Å, $Mg^{2+} = 0.72$ Å and $Al^{3+} = 0.535$ Å.

(24) **(C).** Penetration of p-subshell electron is less than s-subshell electrons. In case of Mg, the first electron is to be removed from completely filled $3s^2$ valence shell configuration as compared to partially filled $3p^1$ of Al. These two factors collectively accounts for the higher ionisation energy of Mg than that of Al. Therefore, (C) option is correct.

(25) **(C).** Down the group non-metalic character decreases & by increase of oxidation number acidic character of oxide increases.

(26) **(A).**
(iii) C < N < O < F (Non-metallic character)
(iv) Correct order is Li < Na < K < Rb < Cs. The chemical reactivity increases down the group with decreasing ionisation energy. Although Li has highest negative reduction potential but its reactivity with water is lowest on account of its higher ionisation energy.

(27) **(C).** When sodium and potassium react with water, the heat evolved causes them to melt, giving a larger area of contact with water, lithium on the other hand, does not melt under these condition and thus reacts more slowly.

	Li	Na	K
Melting point (°C)	180	98	64

(28) **(B).** Solubility of alkaline earth metal hydroxide increases as the solubility product increases.
$Be(OH)_2$ < ------ < $Ba(OH)_2$
K_{sp} 1.6×10^{-26} 5.4×10^{-3}

(29) **(B).** $CaO + H_2O \xrightarrow{\text{Hissing sound}} Ca(OH)_2 + \text{Heat}$
$CaO + CO_2 \rightarrow CaCO_3$

(30) **(C).** $B(OH)_3 + 2HOH \rightleftharpoons [B(OH)_4]^- + H_3O^+$
In aqueous solution the boron completes its octet by accepting OH^- from water molecules. It therefore function as a weak monobasic lewis acid.

(31) **(D).** Borax is not used as a fuel in rockets.

(32) **(C).** $Na_2CO_3 + H_2O \rightarrow 2NaOH + CO_2$
$4\,OH^- + Al \rightarrow [Al(OH)_4]^-$ (soluble complex)

(33) **(B).** It is acidic because of the hydrolysis of $Al_2(SO_4)_3$ according to the following reaction.
$Al_2(SO_4)_3 + 6H_2O \rightarrow 2Al(OH)_3 + 3H_2SO_4$.

(34) **(B).** CO burns with blue flame and also acts as reducing agent used in the extraction of various metal from their oxide ores.

(35) **(B).** $2PbO_2 + 4HNO_3 \rightarrow 2Pb(NO_3)_2 + 2H_2O + O_2$

(36) **(A).** The first three successive ionisation energies of an element x are 520, 8000 and 11820 kJ/mol. The element x belongs to group 1.

(37) **(D).** $Na_2[B_4O_5(OH)_4]\,.\,8\,H_2O$

(38) **(D).** (A) $AlCl_3 + 3H_2O \rightarrow Al^{3+}(aq) + 3Cl^-(aq)$
(B) It exists as dimer in non-polar solvents like benzene and in vapour state below 350°C.
(C) $4Al_2O_3 + 3S_2Cl_2 + 9Cl_2 \rightarrow 8AlCl_3 + 6SO_2\uparrow$

(39) **(C).** $NH_3 + CO_2 + H_2O \rightarrow NH_4HCO_3$
$NaCl + NH_4HCO_3 \rightarrow NaHCO_3 + NH_4Cl$
$2NaHCO_3 \xrightarrow{150°C} Na_2CO_3 + CO_2 + H_2O$
$2NH_4Cl + Ca(OH)_2 \rightarrow 2NH_3 + H_2O + CaCl_2$ (by product).

(40) **(B).** $4KO_2 + 2CO_2 \rightarrow 2K_2CO_3 + 3O_2$

(41) **(D).** In IIA group as we move from top to bottom polarization power of cation decreases and thermal stability of metal carbonate increases.

(42) **(A).** Solubility of alkaline earth metal hydroxide increase down the group.

(43) **(D).**

(44) **(A).**

(45) **(A).**

(46) **(A).** This question requires you to recall and understand the meaning of the gravitational force law:

$$F_G = \frac{Gm_1m_2}{r^2}$$

You also need to understand that the gravitational force, as required by Newton's third law, is symmetric in the sense that the forces are an equal and opposite action reaction pair. The force acting on mass m_1 has the same magnitude as the force acting on mass m_2, though the forces work in opposite directions. Thus, changing the value of one of the masses will affect the force acting on either mass. You can immediately eliminate (D). Now look at the form of the force equation. If the other variables do not change, then the force is directly proportional to either of the masses. So doubling the value of either one of the masses, while not changing anything else, will double the value of the force. Therefore, the correct answer is that the force doubles, choice (A).

(47) **(C).** To answer this question, you should recall that there are two expressions for the gravitational force acting on an object near the surface of the Earth. The weight, w, of an object of mass m is given by $w = mg$
Applying the law of gravity to an object near the Earth's surface gives $F = \frac{GM_Em}{R_E^2}$

Because an object's weight is the force of Earth's gravity acting on the object, F = w, and we have

$$mg = \frac{GM_Em}{R_E^2}$$

Canceling out the mass, m, of the object leaves us with the answer: $g = \frac{GM_E}{R_E^2}$

(48) **(C).** Note that it is common to approximate the acceleration of gravity in this portion of the test as $g = 10\ m/s^2$. Recall that gauge pressure is the absolute pressure minus the value of atmospheric pressure, P_0, which can be approximated as 10^5 Pa. The geometry in this problem works out that there is 15cm (= 0.15 m) of the straw above the surface of the water in the cup. Because the pressure in the straw at the elevation of the water surface in the cup is equal to atmospheric pressure, the pressure at the top of the straw needs to be such that the column of water in the straw creates that much pressure. The absolute pressure at the top of the straw is therefore derived from

$P_0 = P_{top} + \rho gh$

Recalling the density of water to be 10^3 kg/m^3, we see that the absolute pressure is

$P_{top} = 10^5$ Pa – 10^3 kg/m$^3 \times 10$ m/s$^2 \times 0.15$ m

$= 9.85 \times 10^4$ Pa

This is one of the given choices, but it is absolute pressure, which is not the answer we want. To obtain the gauge pressure, the value of $P_0 = 10 \times 10^4$ Pa must be subtracted, leaving a value of -1.5×10^3 Pa. The other choices are also results of common errors in this calculation.

(49) **(C).** Although the units of pressure are officially pascals, atmospheres are still often used.

(50) **(B).** The continuity equation says that the velocity in the second section of the pipe is given by $\frac{v_2}{v_1} = \frac{A_1}{A_2}$

Therefore, the flow velocity increases as the area decreases. Since the area is proportional to the square of the diameter, the ratio is $(4/2)^2 = 4$.

(51) **(D).** Because the density of the gas is less than that of the surrounding fluid (air), the balloon will certainly rise. Therefore responses (B) and (C) are not correct.

To find the correct response, we must perform a force balance on the balloon. The two forces are the buoyant force and the weight. The net force will then yield the acceleration from Newton's second law.

$F_{buoyant} = \rho_{air} V_{balloon} g$

$F_{weight} = \rho_{gas} V_{balloon} g$

Using the fact that $\rho_{air} = 2 \times \rho_{gas}$, we can write:

$F_{net} = F_{buoyant} - F_{weight} = m_{gas} a_{balloon}$

$2\rho_{gas} V_{balloon} g - \rho_{gas} V_{balloon} g = \rho_{gas} V_{balloon}$

If we cancel the term $\rho_{gas} V_{balloon}$ from both sides, we see that the correct answer is a = g upward.

(52) **(C).** Recalling that Bernoulli's equation is actually a form of the conservation of energy for a fluid, we noted earlier that water escaping to atmospheric pressure from the bottom of a tank behaved as if it had "fallen" from the height of the surface. If this is true, then the kinetic energy of the fluid at the exit is exactly equal to the change in gravitational potential energy due to the "fall." If the fluid is directed straight upward with that kinetic energy, it will rise, gaining gravitational potential energy until the kinetic energy is exhausted. In the absence of friction, this will result in the water returning to the original elevation.

(53) **(D).** Pascal's principle, which says that the pressure exerted by F_{in} is transmitted throughout the fluid. The force on the other end, therefore, is multiplied by the ratio of the areas. This ratio is the same as the ratio of the squares of the diameters, or $\frac{2^2}{1^2} = 4$.

Therefore, the force will be $F_{out} = 4 F_{in} = 400$ N.

(54) **(D).** The buoyant force is equal to the weight of the water displaced. A volume of 5 m^3 is displaced. Multiply the volume, V, by the density, $\rho = 1{,}000$ kg/m^3, to get the mass, m, of water displaced.

$m = \rho v = 5{,}000$ kg

Now multiply the mass by the acceleration of gravity, g = 10 m/s^2, to get the weight, w, of the water displaced.

$w = mg = (5{,}000 \text{ kg})(10 \text{ m/s}^2) = 50{,}000$ N

The weight of the water displaced, and therefore the buoyant force on the boat, is 50,000 N.

(55) **(D).** Since we know the weight of the object and the acceleration due to gravity on planet Y, we can use this information to determine the mass of the object. The weight of the object is determined by

$w_y = mg_y$

Solving for m, we get $m = \frac{w_y}{g_y}$

Substituting $w_y = 150$N and $g_y = 1.5g$ (let g = 10 m/s^2)

yields $m = \frac{w_y}{g_y} = \frac{150 \text{ N}}{1.5\,(10 \text{ m}/\text{s}^2)} = 10$ kg

(56) **(B).** In the previous problem, we determined the mass to be 10 kg. We can use this to determine the acceleration due to gravity on planet X.

$$g_x = \frac{w_x}{m} = \frac{5\text{N}}{10 \text{ kg}} = 0.5 \text{ m}/\text{s}^2$$

(57) **(A).** Gravitational force, $F \propto \frac{1}{r^n}$; $F = \frac{k}{r^n}$

where k is a constant.

For a planet, moving in a circular orbit of radius R,

$$F = \frac{k}{R^n} \quad \text{But, } F = m\omega^2 R$$

$$\Rightarrow \frac{k}{R^n} = mR\left(\frac{2\pi}{T}\right)^2 \Rightarrow \frac{k}{R^{n+1}} = \frac{m\,(2\pi)^2}{T^2}$$

$$\Rightarrow T^2 \propto R^{n+1}$$

$$\therefore \quad T \propto R^{\frac{n+1}{2}}$$

(58) **(C).** $Y = \frac{F/A}{\Delta\ell/\ell} \quad \therefore F = \frac{YA}{\ell}\cdot\Delta\ell = k\cdot\Delta\ell$

Force $\propto$ extension

If the extension is x, work done in extending by dx

$$dW = kx\,dx \qquad \therefore \; W = \frac{1}{2}k\cdot x^2$$

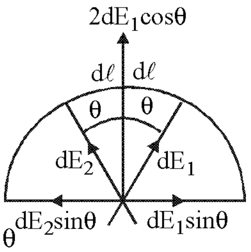
If x is $\ell' - \ell$, $W = \frac{1}{2}k\,(\ell' - \ell)^2$

i.e., work done is $\frac{1}{2}\frac{YA}{\ell}(\ell - \ell')^2$

(59) **(C).** Consider two small elements each of length $d\ell = rd\theta$ symmetrically.

$\pi r = \ell$

Resolve the elemental field intensities $\because$ $|dE_1| = |dE_2|$



$$dE = 2dE_1 \cos\theta = \frac{2Grd\theta}{r^2}\cos\theta$$

G = Gravitational constant

λ = Linear mass density = m/ℓ

or $\quad dE = \frac{2\lambda G}{r}\int_0^{90°}\cos\theta\, d\theta = \frac{2\lambda G}{r} = \frac{2\pi Gm}{\ell^2}$

(60) **(A).** The terminal velocity of the spherical raindrop of radius r is given by $v_t = \frac{2r^2\rho g}{9\eta}$, where ρ is the density of water and η is the viscosity of air.

Substituting $r = 0.3$ mm $= 0.3 \times 10^{-3}$ m, $\rho = 10^3$ kg/m^3, $g = 9.8$ m/s^2 and $\eta = 1.8 \times 10^{-5}$ Ns/m^2, we get

$$v_t = \frac{2 \times (0.3)^2 \times 10^{-3} \times 9.8}{9 \times 1.8 \times 10^{-5}} = 10.9 \text{ m/s}$$

(61) **(C).** Since the bubbles coalesce in vacuum and there is no change in temperature, hence its surface energy does not change. This means that the surface area remains unchanged. Hence,

$$4\pi a^2 + 4\pi b^2 = 4\pi R^2 \text{ or } R = \sqrt{a^2 + b^2}$$

(62) **(C).** $h = \frac{2S\cos\theta}{r\rho g}$

Mass of water in the first tube,

$$m = \pi r^2 h\rho = \pi r^2 \times \left(\frac{2S\cos\theta}{r\rho g}\right) \times \rho = \frac{2\pi rS\cos\theta}{g}$$

$\therefore\ m \propto r$. Hence, $\frac{m'}{m} = \frac{2r}{r} = 2$ or $m' = 2m = 2 \times 5g = 10g$

(63) **(D).** Here, $v_1 = 4$ m/s, $A_1 = \pi r_1^2 = 16\pi \times 10^{-4}$ m^2

$A_2 = \pi r_2^2 = \pi \times 10^{-4}$ m^2

Using, $A_1v_1 = A_2v_2$

$$\therefore\ v_2 = \frac{A_1v_1}{A_2} = \frac{16\pi \times 10^{-4} \times 4}{\pi \times 10^{-4}} = 64 \text{ m/s}$$

Velocity of water at free end, $v_2 = 64$ m/s

(64) **(A).** Height of water rise in a capillary tube

$$h = \frac{2T\cos\theta}{rdg};\ h_1 = \frac{2T_1\cos\theta_1}{rdg};\ h_2 = \frac{2T_2\cos\theta_2}{rdg}$$

Given, $h_1 = h, T_1 = T, \theta_1 = 0$

$$\therefore\ h = \frac{2T}{rdg} \quad \text{.......... (1)}$$

Given $T_2 = \sqrt{2}\,T,\ \theta = 45°, \cos 45° = \frac{1}{\sqrt{2}}$

$$\therefore\ h_2 = \frac{2\sqrt{2}\,T \times \frac{1}{\sqrt{2}}}{rdg} \quad \text{.......... (2)}$$

From Eqs. (1) and (2), we observe, $h_2 = h$.

Hence, same mass of liquid rises into the capillary as before 5×10^{-3}.

(65) **(A).** $\pi\left(\frac{D}{2}\right)^2 \times v = n\left(\frac{d}{2}\right)^2 \times v' \Rightarrow v' = \frac{D^2v}{nd^2}$

(66) **(C).**

(i) According to Hooke's law within the elastic limit, stress is proportional to the strain.

(ii) Shearing strain is defined as angle in radian through which a plane perpendicular to the fixed surface of the cubical body gets turned under the effect of tangential force.

(iii) The temporary loss of elastic properties because of the action of repeated alternating deforming force is called elastic fatigue.

(67) **(D).** F = weight of liquid

(68) **(D).** $\rho gh\, \pi r^2 = 2\pi r\, S\cos\theta$

$$\Rightarrow\ r = \frac{2S\cos\theta}{\rho gh} = \frac{2 \times 0.1 \times 0.5}{10^3 \times 10 \times 10} = 10^{-6} \text{ m}$$

(69) **(B).** Since no external force is applied.

$\therefore\ M\frac{dV_{cm}}{dt} = 0$

V_{cm} = constant

$\therefore\ V_{cm} = 0$. So, $V_{rel} = 2V$

(70) **(C).** Strain developed: $\in = \alpha\,\Delta T = (12 \times 10^{-6})(50)$
$= 6 \times 10^{-4}$

Strain will be negative, as the rod is in a compressed state.

(71) **(A).** Viscous force $= 6\pi\eta rv = 6\pi \times 18 \times 10^{-5} \times 0.03 \times 100$
$= 101.73 \times 10^{-4}$ dyne

(72) **(A).** $2T\ell\cos\theta = \pi r^2 \ell dg$

$$r = \sqrt{\frac{2T}{\pi dg}}$$

(73) **(D).** Above the surface of earth at height h, acceleration due to gravity $g' = g\frac{1}{\left(1 + \frac{h}{R}\right)^2}$

Given that, $g = 10$ m/s^2 at surface of earth

$$g' = 10\frac{1}{\left(1 + \frac{h}{R}\right)^2} \quad \text{........ (1)}$$

Below the surface of earth at depth h, acceleration due to gravity $g'' = g\left(1-\frac{h}{R}\right) = 10\left(1-\frac{h}{R}\right)$ .... (2)

From eq. (1), $9 = 10\left(1+\frac{h}{R}\right)^{-2}$

By Binomial theorem, $9 = 10\left(1-\frac{2h}{R}\right)$ .... (3)

$\therefore \frac{9}{10} - 1 = -\frac{2h}{R}$ or $-\frac{1}{10} = -\frac{2h}{R}$ or $\frac{R}{20} = h$

Now, we put the value of h in eq. (2), we have

$g'' = 10\left(1-\frac{R/20}{R}\right) = 10\left(1-\frac{1}{20}\right) = 10\left(\frac{19}{20}\right)$

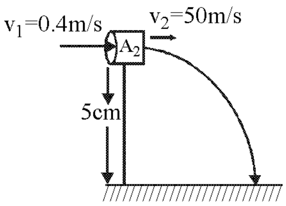
$= 9.5 \text{ m/s}^2$

(74) (B). Volume of 8 drops of water = Vol. of big drop of water
Given that, Radius of small drop r = 0.6 mm

$\therefore 8\times\frac{4}{3}\pi(0.6)^3 = \frac{4}{3}\pi R^3$ or $2 \times 0.6 = R$ or $R = 1.2$mm

where R is the radius of big drop.
Change in surface area
$\Delta A = 4\pi r^2 \times 8 - 4\pi R^2$
$= 4\pi[(0.6)^2 \times 8 - (1.2)^2] \times 10^{-6}$
$= 4\pi[0.36 \times 8 - 1.44] \times 10^{-6}$
$= 4\pi[2.88 - 1.44] \times 10^{-6}$
$\Delta A = 4\pi(1.44) \times 10^{-6}$
Energy dissipated in this process
$E = T \times \Delta A = 0.072 \times 4\pi \times 1.44 \times 10^{-6}$
$= 28.8 \times 10^{-2} \times \pi \times 1.44 \times 10^{-6}$
$E = 4.15\pi \times 10^{-7}$ J

(75) (C).



Let A_1 is cross-sectional area of piston of syringe and A_2 the cross-sectional area of nozzle.
From principle of continuity for non-viscous liquid.
$A_1v_1 = A_2v_2$
$10^{-4} \times \pi r_1^2 \times 0.5 = 10^{-6} \times \pi r_2^2 \times v_2$
where r_1 = radius of syringe, r_2 = radius of nozzle
or $10^{-4} \times (1/2)^2 \times 0.5 = 10^{-6} \times (1/2)^2 \times v_2$
or $u_2 = 50 \text{ ms}^{-1}$

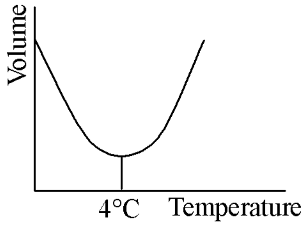
From Torricelli's theorem, $h = \frac{1}{2}gt^2$

$\therefore 5 = \frac{1}{2}\times 10\times t^2 \Rightarrow t = 1$s

This is the time taken for the water zet to reach upto the ground.
Horizontal distance $R = v_2 \times t = 50 \times 1 = 50$ m

(76) (D). Mass remains same.

(77) (C).



(78) (D). Bulk Modulus [k] = $\frac{\text{Hydraulic stress}}{\text{Strain}}$

(79) (A). From the relation, $h = \frac{2T\cos\theta}{rdg}$

where r = radius of capillary.
h = rise or fall of the liquid.
g = acceleration due to gravity.
d = density of the liquid.

$\therefore h \propto \frac{1}{g} \Rightarrow \frac{h_1}{h_2} = \frac{g_1}{g_2}$

According to the quesiton,
On earth, $h_1 = h$, $g_1 = g$
On moon, $h_2 = ?$, $g_2 = g/6$

$\frac{h_2}{h} = \frac{g}{g/6} \Rightarrow h_2 = 6h$

Hence, the rise of the liquid column on the moon becomes six time that on the earth's surface.

(80) (A). $g = \frac{GM}{R^2}$

If M' = M/2 and R = R/2 then

$g' = \frac{G(M/2)}{(R/2)^2} = \frac{2GM}{R^2} = 2g$

(81) (B). Time period is independent of mass.

(82) (D). According to Kepler's II law,
Areal velocity of the planet is constant
i.e., A/t = constant

$\Rightarrow \frac{A_1}{2} = \frac{A_2}{3} = \frac{A_3}{6} \Rightarrow 3A_1 = 2A_2 = A_3$

(83) (C). $T = 2\pi\sqrt{\frac{R}{g}} = 2\pi\sqrt{\frac{6400\times 10^3}{10}}$

T = 5024 s = 83.73 min

(84) (B).

(85) (D). The buoyant force (19.6 N) is less than the weight (29.4N) of the object. Therefore, the object sinks.

(86) (D). $A_1 v_1 = A_2 v_2$; $10 \times 1 = 5 \times v_2$; $v_2 = 2$m/s

$\frac{p_1}{\rho} + \frac{v_1^2}{2} = \frac{p_2}{\rho} + \frac{v_2^2}{2}$

$$\frac{2000}{1000}+\frac{1^2}{2}=\frac{p_2}{1000}+\frac{2^2}{2}\ ;\ 2.5=\frac{p_2}{1000}+2$$

$p_2 = 500\text{Pa}$

(87) **(D).** $Y=\frac{F}{A}\times\frac{\ell}{e}\ ;\ e\propto\frac{\ell}{r^2}$

(1) $e_1 = 1/10$ (2) $e_2 = 1/12$
(3) $e_3 = 1/8$ (4) $e_4 = 1/4$

(88) **(D).** $v \propto r^2\ ;\ \frac{10}{v^2}=\frac{r^2}{8^{2/3}r^2}=\frac{1}{4}\ ;\ \frac{v_1}{v_2}=\frac{r_1^2}{r_2^2}\ ;\ v_2 = 40\text{ cm/s}$

(89) **(B).** $h \propto 1/r$
$\therefore$ greater for the tube of smaller diameter.

(90) **(C).** $R.D=\frac{W\text{ (air)}}{W\text{(lost)}}\ ;\ RD_{(I)}=\frac{W}{W_1}\ ;\ RD_{(L)}=\frac{W}{W_2}$

$$\frac{RD_{(I)}}{RD_{(L)}}=\frac{W_2}{W_1}\ ;\ \frac{W_1}{W_2}=\frac{RD\text{ (L)}}{RD\text{ (I)}}$$

$RD\text{ (L)} > RD\text{ (I)} \quad \therefore\ \frac{W_1}{W_2} > 1$

(91) **(C).** The dashed line shows the catalyzed reaction. Enzymes lower the energy of activation. The letter that shows the uncatalyzed reaction is B.

(92) **(D).** The potential energy of the products is the same for both the catalyzed and uncatalyzed reactions.

(93) **(A).** The forward reaction is exergonic (exothermic). That means the potential energy of the products is less than the potential energy of the reactants because energy was given off. Enzymes catalyze reactions in both directions. The energy given off by the exothermic (forward) reaction must be the same as the energy absorbed by the endothermic (reverse) reaction.

(94) **(C).** Rough E.R. has ribosomes attached to it that produce proteins.

(95) **(D).** The nucleoli produce ribosomal RNA, which is a main component of the ribosome.

(96) **(B).** Microtubules organized in a 9 triplet configuration make up the spindle fibers that pull apart the chromosomes during anaphase of cell division. Microtubules with the same 9 triplet configuration also make up the centrioles that anchor the spindle fibers.

(97) **(D).** Human enzymes are most active at body temperature, about 37°C. However, there is no single optimal pH for enzyme function; gastric enzymes are most active at pH 3, while hydrolytic enzymes of the small intestine are most active in the alkaline pH, around 8. Enzymes are proteins that speed up reactions by lowering the energy needed to start the reaction, and they catalyze reactions in both directions. Human enzymes begin to denature at 40°C, which is why a high fever is dangerous.

(98) **(B).** Glycoproteins sticking up from the plasma membrane form part of the glycocalyx, which is important for cell identification. Cholesterol makes the plasma membrane itself more stable and less fluid. Protein channels, such as the ATP synthase channels, enable large polar proteins to pass through the membrane. Single ions channels, such as those found at the terminal branch of a neuron, allow calcium ions to flood into the terminal branch and cause the vesicles to release neurotransmitter into the synapse. Phospholipids make up 60% of most plasma membranes. In diagrams, they look like balloons with two tails.

(99) **(A).** Golgi apparatus consists of layers of membranes. Basal bodies, spindle fibers, and centrioles consist of 9 triplets of micro tubules organized around an open central area. Cilia consist of 9 pairs of micro tubules organized around 2 single micro tubules.

(100) **(C).** Facilitated diffusion is a type of diffusion, so it requires no energy. It makes use of membrane channels, such as channels to assist glucose to diffuse in to a cell.

(101) **(D).** This sketch represents the ATP synthetase molecule that produces ATP during the electron transport chains of aerobic respiration and the light-dependent reactions of photosynthesis. It is found in the cristae membrane of mitochondria and the thylakoid membrane of the chloroplast.

(102) **(A).** Most ATP in a cell is produced from chemiosmosis at this ATP synthetase channel.

(103) **(D).** ATP is produced as protons flow down a steep gradient from one side of the membrane through the ATP synthetase molecule to the other side. This proton motive force exists because of the steep proton gradient. If protons could diffuse through the membrane at any point, there could be no gradient and no ATP produced. Therefore, allowing protons to diffuse through the membrane would destroy the gradient and destroy the ability of the cell to make ATP.

(104) **(D).** Recombination occurs as a result of crossing-over, which happens during prophase of meiosis I when homologous chromosomes pair up. This process of pairing up is called synapsis; it occurs during prophase I.

(105) **(C).** The nucleolus is visible during interphase and the nuclear membrane is intact. The chromosomes appear as chromatin network, as dots, not as linear, condensed chromosomes.

(106) **(D).** Metaphase II is like mitosis, chromosomes line up single file on the metaphase plate. Picture 1 shows meiosis I, with chromosomes lined up double file. Picture 2 shows anaphase 1, with replicated chromosomes being pulled apart by the spindle fibers.

(107) **(D).** Enzymes are protein that, in small amounts, speed up the rate of a biological reactions and help in regulating metabolism. Hormones are also metabolic regulator and help in stimulation or inhibition of one or more physiological processes.

Vitamines are accessory food factors which are required in small quantity for controlling metabolism and body functioning.

(108) (C). Sucrose, glucose and fructose, all the three sugars are found in plants. Sucrose is the commercial sugar which is obtained from sugarcane. Glucose is the main respiratory substrate in plants and animals. Fructose can also function similarly. Moreover fructose is also the common fruit sugar.

Lactose or milk sugar is found naturally in milk. It is reducing sugar which is formed in the mammary glands of mammal through condensation of two hexose molecules.

(109) (C). The model of plasma membrane is fluid-mosaic model which was proposed by Singer and Nicolson in 1972. According to this model, the membrane does not have a uniform disposition of lipids and proteins but is instead a mosaic of the two. Further, the membrane is not solid but is quasifluid.

(110) (C). Cell theory was proposed by a German botanist M.J. Schleiden and another German, a zoologist T.S. Schwann in 1839.

(111) (A). Chromosome replication occurs once but meiosis has two M-phases each with its own karyokinesis and cytokinesis. As a result chromosome number is halved. The transition period between M-phase 1 (meiosis I) and M-phase II (meiosis II) is short and without DNA replication. It is called interkinesis.

(112) (D)	**(113)** (B)	**(114)** (D)
(115) (A)	**(116)** (D)	**(117)** (C)
(118) (B)	**(119)** (A)	**(120)** (D)
(121) (C)	**(122)** (A)	**(123)** (D)
(124) (B)	**(125)** (D)	**(126)** (D)
(127) (C)		

(128) (D). The steroids have three six membered rings and one five membered ring.

(129) (C). The polar fibres extend from one end of the pole of the spindle to the other.

(130) (B). Option B is the correct sequence of changes during prophase I of meiosis.

(131) (B). Crossing over occurs during pachytene which results in genetic recombination.

(132) (A). The chromosomes with centromere near the end is called as Acrocentric.

The chromosomes with centromere at the center is called as Metacentric.

The chromosomes with centromere at near the center is called as Sub- Metacentric.

The chromosomes with centromere at end is called as Telocentric.

(133) (A). Protoplasm is the fundamental material of all living organisms. The colloidal theory of protoplasm was proposed by **Fisher** (1894) and Hardy (1899). According to them protoplasm is a heterogenous polyphasic colloidal system, which appears in different phases like reticular, fibrillar, granular or alveolar.

JE Purkinje in 1839-40 and Hugo Von Mohi in 1846 coined the term protoplasm and described its relationship to the cell.

Max Schultz (1861) proposed protoplasm theory, i.e., cell is an accumulation of living substrances, which have a nucleus and limited by an outer membrane.

E Strassburger (1875) described mitosis in plants.

(134) (B). Protein synthesis takes place in ribosomes, which attached to surface of endoplasmic reticulum by ribophorin-I and ribophorin-II.

About 50 hydrolytic enzymes are found in the lysosome. They iniclude proteases, nucleases, glycosidases, lipases, phospholipases, phosphatases and sulphatases. All lysosomal enzymes are acid hydrolases and optimally active at pH 5.0.

(135) (C). Endoplasmic reticulum is of two types

(a) **Rough endoplasmic reticulum**

Ribosomes are attached on the surface of rough endoplasmic reticulum by ribophorin proteins. Ribosomes are the site of protein synthesis.

(b) **Smooth endoplamic reticulum**

This type of endoplasmic reticulum possess smooth wall because the ribosomes are not attached to the surface. SER performs synthesis of lipids (phospholipid, cholesterol, etc.) and steroid hormones.

(136) (D). Membrane proteins that speed the movement of solute across a membrane by facilitatinig diffusion are called transporters or **permeases**. The membrane proteins lower the activation energy for transport by providing an alternative path for specific solutes through the lipid bilayer.

The enzyme proteases catalyse the hydrolytic deavage of peptide bonds. Pepsin is also protease. Pepsin causes the cleavage of polypeptide chain at Phe, Trp. Tyr. amino acids points.

(137) (B). In case of allosteric enzyme there is no competition for active site between substrate and inhibitor but the inhibitor fixes itself with some other site of enzyme called allosteric site, and causes the conformational change in active site of enzyme so that substrate cannot bind and reaction stops.

Competitive inhibitor is a substance, which closely resembles the substrate in molecular structure and compete with the substrate for binding at active site. As a result reaction rate slow down.

The enzyme require a non-protein component called prosthatic group for their activity. When the prosthatic group is an organic substance it is called **co-factor** or **co-enzyme**. The co-enzynmes are often vitamins (NAD, ANDP, ATP, Co-A, FMN, FAD).

(138) (A). Enzymes are proteinaceous compounds that accelerate a chemical reaction without changing its direction. On the basis of types of reaction they catalyse the enzymes are of following six types:

(i) **Oxidoreductase** Transfer of H and O atoms or electrons from one substance to another, e.g., Dehydrogenase, oxidase, catalases.

(ii) **Transferases** Transfer of a functional group from one substance, e.g., Phosphorylase, kinase.

(iii) **Hydrolases** Hydrolysis of the substrate e.g., Lipase, amylase, peptidase, protease, etc.

(iv) **Lyases** Splitting of C—C, C—O, C—N, C—H and other similar bonds not by hydrolysis thereby leaving a double bond, e.g., Decarboxylase, fumarase, aldolase.

(v) **Isomerases** Change of a substrate into a related form by intramolecular rearrangement, e.g., Phosphohexo isomerase.

(vi) **Ligases (synthatases)** Joining of two molecules by forming new bonds with simultaneous breakdown of ATP, e.g., Acyl Co-A synthase, pyruvate carboxylase.

(139) (B). The amino acids, which are synthesized by the human (usually 10 amino acids) and not obtained from plant sources are called **non-essential amino acids.** The amino acids are Synthesized from precursors in glycolysis, Kreb's cycle and pentose phosphate pathway, i.e., during **protein anabolism.**

(140) (B). Spindle fibres are formed of microtubules, which play an important role in movement of chromosomes and centrioles during cell division. Biochemically a profilament of microtubule is made of a protein called tubulin. Tubulin is an acidic protein, which occurs in two different forms called α-tubulin and β tubulin. Cytoplasmic microtubules are highly dynamic structures constantly forming and dis-appearing depending on cell activities.

Myosin is fibrous functional protein of muscle **Myoglobin** protein of muscle cells act as reservoir of oxygen.

(141) (A). Howard and Pelc (1953) have divided cell cyde into four phases or stages, i.e., G_1, S, G_2 and M-phase. The G -phase, S-phase and G_2-phase are combined to form the interphase.

G_1-phase It involves transcription of t-RNA m-RNA and r-RNA synthesis of regulatory proteins, enzymes necessary for DNA synthesis, tubulin and other mitotic proteins. The G1 -phase where differentiated somatic cell arrested is called **G_0-Phase.**

S-Phase During S-phase replication of DNA and synthesis of histone proteins occur.

G2-Phase Synthesis of RNA and proteins continue, which are required for cell growth.

(142) (C). Cell cycle is the sequence of stages that a cell passes through between one cell division and the next. The cell cycle can be divided into four main stages: (i) M-phase, which consists of mitosis (nuclear division) and cytokinesis (cytoplasmic division), (ii) G_1-phase, in which there is a high rate of biosynthesis and growth; (iii) S-phase, in which the DNA content of the cell doubles and the chromosomes replicate; (iv) the G_2-phase, during which the final preparations of cell division are made.

(143) (D). G_2 phase : Production of energy required for spindle formation.

Prometaphase : fusion of microtubules to form spindle apparatus.

Anphase : Contraction of tubulin proteins

Pachytene : Recombination of genetic material.

(144) (D). Peroxisomes are organelles found in nearly all eukaryotic cells. Their existence was first discovered by J Rhodin in 1954. Peroxisomes in leaves are involved in photorespiration.

(145) (D). Singer and Nicolson states that cell membrane is considered to be highly fluid. The integral proteins are capable of showing lateral diffusion in the lipid bilayer, studies with NMR (Nuclear Magnetic Resonance) and ESR (Electron Spin Resonance) technique indicate that lipid bilayer has many dynamic motional properties. Quasifluid nature of lipid enables lateral movement of proteins within the overall bilayer, The fluid nature of membrane is important for growth, formation of intercellular junctions, secretion endocytosis, cell division etc.

(146) (B). During S-phase DNA replicates in semiconservative manner and histone proteins are synthesized. Each cell is with double the amount of DNA but chromosome number remains same. The damages DNA is repaired is G_2-phase.

(147) (A).

(148) (D). A = Principal director of macromolecular traffic (Golgi bodies)

B = Site of oxidative phosphorylation (mitochondri(a)

C = intracellular transport (ER)

D = site of phosphorylation (chloroplast)

E = storage of cell sap (vacuole)

(149) (B). E.coli

Because, it is bacterium. It undergoes binary fission.

(150) (A). A chiasma in genetics, is thought to be the point where two homologous non-sister chromatids exchange genetic material during chromosomal crossover during meiosis (sister chromatids also form chiasmata between each other, but because their genetic material is identical, it does not cause any change in the resulting daughter cells). The chiasmata becomes visible during the diplotene stage of prophase I of meiosis, but the actual "crossing-over" of genetic material is thought to occur during the previous pachytene stage. When each tetrad, which is composed of two pairs of sister chromatids, begins to split, the only points of contact are at the chiasmata.

(151) (A).

(152) (A).

(153) (A).

(154) (B). Separation of factors takes place during gamete formation and during gametogenesis meiosis takes place.

(155) (A). This is in the phase of DNA synthesis.

(156) (C). Cillia and flagella originate from basal body. Chromatophores are pigment-containing and light-reflecting organelles in cells of wide range of animals.

(157) (A).

(158) (A).

(159) (A).

(160) (B). (1) = achlorophyllous
((3) and ((4) = are not thallophytes as they possess root and leaf

(161) (B).

(162) (A). This stage shows the duplicated sister chromatids aligned at the cell equator during metaphase II prior to separation in anaphase II.

(163) (C). The products of mitosis are diploid daughter cells.

(164) (C). Sister chromatids separate during anaphase of mitosis and anaphase II of meiosis II.

(165) (A). Homologous chromosomes will pair to prepare for crossing over in meiosis I.

(166) (B). Four daughter gametes are produced as a result of divisions at the end of meiosis II and cytokinesis.

(167) (D). Zinc is a cofactor for the proteolytic enzyme carboxypeptidase.

(168) (B). A diploid cell with 50 chromosomes has 25 pairs, one of which, for most multicellular organisms, are the sex chromosomes. During mitosis the cell will remain diploid, so in metaphase there will be 100 chromatids. Meiosis in this cell will produce haploid daughter cells with only 25 chromosomes.

(169) (B). G_2 is a phase of interphase in which the replication of mitochondria and chromosome condensation occurs. G_1 is also a phase of interphase and is the cell's primary growth phase. M is the phase of a cell cycle in which the stages of mitosis occur and C is the phase in which the cytoplasm divides.

(170) (D). At the end of telophase the cell has divided its replicated chromosomes into two nuclei, therefore mitosis is complete. During prophase, the nuclear envelope disassembles and the mitotic spindle begins to form. During metaphase, the chromosomes align in the center of the cell and during anaphase, the sister chromatids separate and move to opposite poles.

(171) (D). During prophase, the nuclear envelope and nucleolus disassemble and the spindle formation begins. During metaphase, the chromosomes align at the center of the cell. During anaphase, the sister chromatids are pulled apart.

(172) (C). Using a microscope he had built, Robert Hooke observed cork and described it as a honeycomb arrangement of compartments he called cells .

(173) (D). Most cells are small because larger cells do not function as efficiently .

(174) (C). During interphase, the DNA replicates and toward the end, the DNA begins to condense into chromosomes. During prophase, the nuclear envelope and nucleolus disassemble and the spindle formation begins. During telophase, the nuclear envelope and nucleolus reform and the spindle is disassembled.

(175) (D). All hereditary information is encoded in DNA, which is divided into several segments and associated with proteins, thus forming chromosomes. Condensed chromosomes are readily seen in dividing cells, but not after cell division as the chromosomes are uncoiled into threadlike strands

(176) (B). The smooth endoplasmic reticulum is part of the endomembrane system that aids in the manufacture of carbohydrates and lipids. Minerals are not synthesized by cells. The cytoskeleton functions as structural support for the cell and the nucleolus (within the nucleus) synthesizes ribosomes.

(177) (D) **(178)** (C)

(179) (A) **(180)** (D)