ALLEN CAREER INSTITUTE
KOTA (RAJASTHAN)
path to success

DISTANCE LEARNING PROGRAMME

(Academic Session : 2015 - 2016)

LEADER TEST SERIES / JOINT PACKAGE COURSE

TARGET : PRE-MEDICAL 2016

Test Type : **ALL INDIA OPEN TEST** (MAJOR) Test Pattern : AIIMS

TEST DATE : 17 - 04 - 2016

ANSWER KEY

Que	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	4	1	2	1	2	1	2	1	4	1	3	1	3	1	1	3	1	3	1	4
Que	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	1	2	3	2	2	3	1	1	3	3	2	2	2	1	2	3	2	1	1	1
Que	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	2	1	4	4	1	1	2	2	3	2	3	4	3	1	3	2	4	3	3	2
Que	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans.	4	1	3	1	2	1	3	3	1	4	1	4	2	3	4	3	3	4	3	4
Que	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Ans.	4	1	3	3	2	3	1	4	3	2	4	4	3	3	4	2	3	1	3	3
Que	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	3	3	1	2	3	3	4	3	1	2	1	2	4	4	1	4	1	4	1	2
Que	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
Ans.	4	2	3	1	4	1	3	4	3	4	3	4	3	4	3	4	2	1	1	1
Que	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
Ans.	3	2	4	1	2	4	1	1	3	1	4	3	4	4	1	3	3	3	2	3
Que	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Ans.	1	1	1	1	3	2	1	2	3	1	1	3	2	1	1	2	2	3	1	2
Que	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
Ans.	4	4	3	3	3	3	4	1	4	3	3	4	3	3	1	4	3	2	3	2

HINT – SHEET

1. $\left|\vec{A}+\vec{B}\right|^2 = A^2 + B^2 \Rightarrow \vec{A} \perp \vec{B}$

2. Particle will execute SHM in tunnel along diameter so time period will $T = 2\pi\sqrt{\frac{R}{g}}$

So time taken from surface to centre

$$t_1 = \frac{T}{4} = \frac{2\pi}{4}\sqrt{\frac{R}{g}}$$

If gravity (g) remains constant then time taken by using equation of motion

$$s = ut + \frac{1}{2}at^2 \quad \Rightarrow R = 0 + \frac{1}{2}g\,t_2^2 \Rightarrow t_2 = \sqrt{\frac{2R}{g}}$$

so $\frac{t_1}{t_2} = \frac{\pi}{2\sqrt{2}}$

3. $B = \frac{\omega_1 - \omega_2}{2\pi} = \frac{506\pi - 500\pi}{2\pi} = 3$

Now

$$A = \frac{I_{max}}{I_{min}} = \left(\frac{A_1 + A_2}{A_1 - A_2}\right)^2 = \left(\frac{4+2}{4-2}\right)^2$$

$$= 9$$

So $A = 9 \quad B = 3$

5. $R = \sqrt{A^2 + B^2 + 2AB\cos\theta}$

As θ increases $\cos\theta$ decreases

so R also decrease

At $\theta = 90° \Rightarrow R^2 = A^2 + B^2$

$\theta > 90° \Rightarrow R^2 < A^2 + B^2$

6. $\cancel{m}gr = \frac{1}{2}\cancel{m}v^2$

$v = \sqrt{2gr}$

7. When source is moving towards observer

$$n' = n\left[\frac{v}{v - v_s}\right]$$

When source is moving away

$$n'' = n\left[\frac{v}{v + v_s}\right]$$

$$\frac{n'}{n''} = \frac{v + v_s}{v - v_s} = \frac{9}{8}$$

$= 8v + 8v_s = 9v - 9v_s$

$17v_s = v$

$$v_s = \frac{340}{17} = 20\text{m/s}$$

8. $CD = 2R \sin 45°$

$= 2 \times \frac{mV}{qB} \times \frac{1}{\sqrt{2}}$

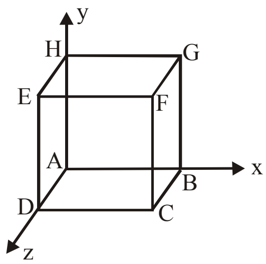
$= 0.14$ m

10. According to theorem of parallel axes,

$$I = \frac{2}{5}M\left(\frac{R}{2}\right)^2 + M(2R)^2 + \frac{2}{5}M\left(\frac{R}{2}\right)^2$$

$$= 4MR^2 + \frac{1}{5}MR^2 = \frac{21}{5}MR^2$$

11.



$\phi_{net} = 6y$ (area of EFGH) – 4x (Area of BCFG)

$= 6 \times 1 \times 1^2 - 4 \times 1 \times 1^2$

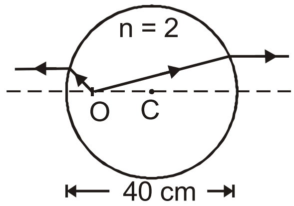
$\frac{q}{\epsilon_0} = 2$

$\theta = 2\epsilon_0$

12. When seen from air through nearest surface,

$$\frac{1}{-5} - \frac{2}{u} = \frac{1-2}{-20}$$

$$\frac{2}{u} = \frac{-1}{20} - \frac{1}{5} = \frac{-1-4}{20} = -\frac{1}{4}$$



$u = -8$ cm.

for second case,

$u = -(40 - 8) = -32$ cm

$$\frac{1}{v} - \frac{2}{-32} = \frac{1-2}{-20}$$

$$\frac{1}{v} = -\frac{1}{16} + \frac{1}{20} = \frac{-5+4}{80}$$

$v = -80$ cm.

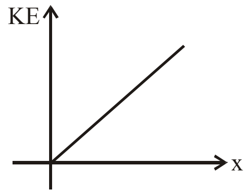
13. According to work energy theorem

$\Delta K = W$

$(KE)_f - (KE)_i = Fx$

$\because (KE)_i = 0$ & F = constant

$\therefore \boxed{(KE)_f \propto x}$



14. The height h to which the liquid rises in a capillary tube is given by:

$$h = \frac{2T\cos\theta}{r\rho g}$$

Since, T cos θ, ρ and g are constants.

Hence, hr = constant.

16. $\frac{I}{O} = -\frac{v}{u}$

If O and I are on same sides of PA . $\frac{I}{O}$ will be positive which implies v and u will be of opposite signs.

Similarly if O and I are on opp. sides, $\frac{I}{O}$ will be -ve which implies v and u will have same sign.

If O is on PA, $I = \left(-\frac{V}{u}\right)(O) = 0$

$\Rightarrow$ I will also be on. P.A.

17. $W = \Delta K = \frac{1}{2} m v_2^2 - \frac{1}{2} m v_1^2$

$W = \frac{1}{2}(2)(-20)^2 - \frac{1}{2}(2)(10)^2 = 400 - 100$

$= 300 \text{ J}$

18. Let d be the inner diameter of hemispherical bowl.
In just floating condition $mg = F_B$

$$\frac{2}{3}\pi\times\left(\frac{1}{2}\right)^3\times(1.2\times10^3) = \frac{2}{3}\pi\left[\left(\frac{1}{2}\right)^3-\left(\frac{d}{2}\right)^3\right]\times(2\times10^4)$$

Solving, we get; d = 0.98 m.

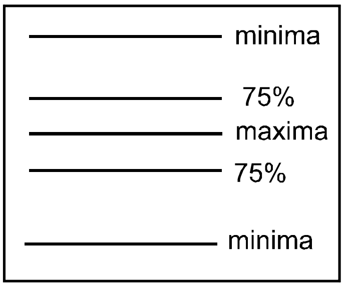
19. When $G \to \infty$ then potential difference across R is 20 V.
then potential difference across 1Ω = 4V

$\therefore \; I = \frac{4}{1} = 4A$

$I = \frac{24}{1+R} = 4$

$R = 5\Omega$

20. Lets look at the screen.



as we know that 75% intensity will correspond to a point where intensity is $3\,I_0$.

$\{\because \quad I_{max} = 4\,I_0\}$

$I = I_0 + I_0 + 2\sqrt{I_0}\sqrt{I_0}\cos(\Delta\phi)$

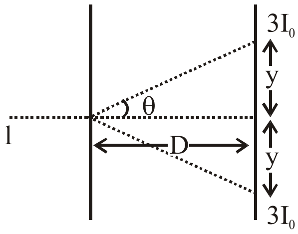
$3I_0 = 2I_0(1+\cos\Delta\phi)$

$\cos(\Delta\phi) = \frac{1}{2}$

$\Delta\phi = \frac{\pi}{3}, 2\pi - \frac{\pi}{3}, 2\pi + \frac{\pi}{3}, \ldots\ldots\ldots\ldots$

$\Delta p = \frac{\lambda}{6}, \lambda - \frac{\lambda}{6}, \lambda + \frac{\lambda}{6}, \ldots\ldots\ldots\ldots$

$\Delta p = \frac{yd}{D}$

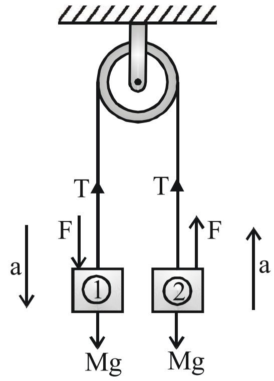


$\frac{yd}{D} = \frac{\lambda}{6} \Rightarrow y = \frac{D}{d}\times\frac{\lambda}{6}, \ldots\ldots\ldots$

$y = \frac{\beta}{6}, \; \beta - \frac{\beta}{6}, \; \beta + \frac{\beta}{6}$

$2y = \frac{2\lambda}{6}\times\frac{D}{d} = \frac{6000\times10^{-10}\times1}{3\times10^{-3}} = 0.2 \text{ mm}$

21.



For block (1)

$Mg + F - T = Ma$ .....(1)

For block (2)

$F + T - Mg = Ma$ .....(2)

From equation (2) – (1)

$2T - 2Mg = 0$

$\boxed{T = Mg}$

22. Take x-axis along the flow and y-axis perpendicular to it.

$\vec{v}_{initial} = v\hat{i}; \; \vec{v}_{final} = v\hat{j}$

$\therefore \; \Delta\vec{v} = v\hat{j} - v\hat{i}$

$\left|\Delta\vec{v}\right| = \sqrt{(v^2+v^2)} = \sqrt{2}v$

Force exerted on the pipe $= \frac{\Delta P}{\Delta t} = \frac{m\Delta v}{\Delta t}$

$= S\rho v(v\sqrt{2}) = \sqrt{2}Sv^2\rho.$

24. $E_1 = 1.23$ eV

$\because\ E \propto \frac{1}{\lambda}$

$E_2 = E_1\left(\frac{\lambda_1}{\lambda_2}\right)$

$= 1.23\left(\frac{10,000}{5000}\right)$

$E_2 = 2.46$ eV

$V_{0_2} = 1.36$ V (Given)

$\because\ eV_{0_2} = E_2 - \phi$

$1.36 = 2.46 - \phi$

$\phi = 1.10$ eV

25. $\vec{V}_{avg} = (V_x)_{avg}\hat{i} + (V_y)_{avg}\hat{j}$

$(V_x)_{avg} = u\cos\theta = \text{constant}$

$(V_y)_{avg} = \frac{\text{Vertical disp}}{\text{time}} = 0$

So Ans. $V_{avg} = u\cos\theta$

26. $I \propto r^2 \Rightarrow \Delta I = 2r\,(\Delta r)$

or $\frac{\Delta I}{I} = \frac{2r(\Delta r)}{r^2} = \frac{2(\Delta r)}{r}$

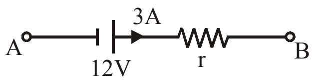
but $\frac{\Delta r}{r} = (\alpha)(\Delta t)$

$\therefore\ \frac{\Delta I}{I} \times 100 = 2(\alpha)(\Delta t)100 = 2(11\times10^{-6})(10)(100)$

$= 0.022.$

27. Potential difference of $3\Omega = 2 \times 3 = 6$volt

and $i = 3A$



$V_B - V_A = 6V$

Apply KVL from A to B

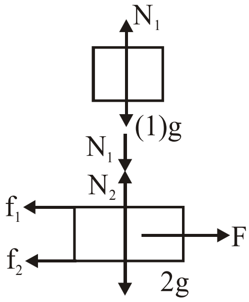
$V_A + 12 - 3r = V_B$

$r = 2\Omega$

28. $N = N_0\left(\frac{1}{2}\right)^{t/T_n}$

$= \frac{\cancel{N_0}\left(\frac{1}{2}\right)^{\frac{30}{10}}}{\cancel{N_0}\left(\frac{1}{2}\right)^{\frac{30}{15}}} = \frac{1}{2} = 0.5$

29.



$N_1 = (1)g$ .....(1)

$N_2 = N_1 + 2g$ .....(2)

From (1) & (2)

$N_2 = 3g$ ....(3)

$f_1 = \mu_1 N_1 = 0.1 \times 1 \times g = 1$ N ...(4)

$f_2 = \mu_2 N_2 = 0.2\,(3g) = 6$ N .... (5)

Now force required to pull the 2kg block

$F = f_1 + f_2 = 1 + 6 = 7$ N

30. $\Delta V = V\gamma\,\Delta T$

$\gamma = \frac{\Delta V}{V\Delta T}$

Now $PT^2 = \text{constant}$

$\frac{T^3}{V} = \text{constant}$

$\frac{3\Delta T}{T} - \frac{\Delta V}{V} = 0$

$\frac{3}{T} - \frac{\Delta V}{V\Delta T} = 0 \Rightarrow \gamma = \frac{3}{T}$

31. $R = \frac{1}{\omega c} = X_c$

$\therefore Z = \sqrt{2}\,R$

$I_0 = \frac{V_0}{\sqrt{2}R}$ ....(1)

when ω becomes $\frac{1}{\sqrt{3}}$ times, X_c will becomes $\sqrt{3}$ times X_c will be $\sqrt{3}$ R

$Z^1 = 2R$

$I_0' = \frac{V_0}{2R}$ ....(2)

$I_0' = \frac{I_0}{\sqrt{2}}$

32. $\Delta m = (1 - 0.993)$ gm

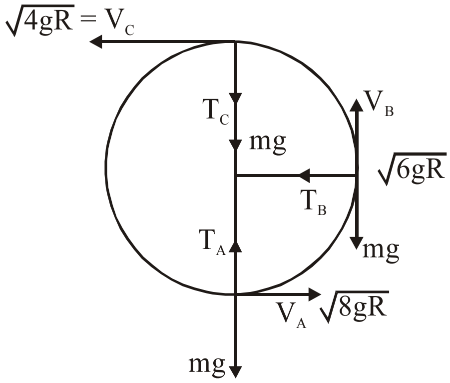
$\Delta m = 0.007$ gm

$\theta = \Delta m \times C^2$

$= 0.007 \times 10^{-3} \times 9 \times 10^{16}$

$= 63 \times 10^{10}$ J

33.



By second Eqaution of motion

$V_C^2 = V_A^2 - 2gh$

$V_C^2 = 8gR - 2g(2R)$

$V_C^2 = 4gR$

$\boxed{V_C = \sqrt{4gR}}$

At point (A)

$T_A - mg = \frac{mv_A^2}{R}$

$T_A = mg + 8mg = 9mg$

At point C

$T_C + mg = \frac{mv_C^2}{R}$

$T_C = 4mg - mg = 3mg$

$\frac{T_C}{T_A} = \frac{3mg}{9mg} = \frac{1}{3}$

34. $ms\Delta T = \frac{1}{2}\left(\frac{1}{2}mv^2\right)$

$\Delta T = \frac{v^2}{4s} = \frac{(200)^2}{4\times125} = \frac{4\times10^4}{4\times125} = 80°C.$

36. $n_i = 2.5 \times 10^{13}\ cm^{-3}$

$n_e \simeq N_D = 0.5 \times 10^{17}\ cm^{-3}$

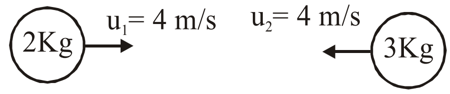
$n_n \simeq N_A = ?$

$n_i^2 = n_e \times n_n$

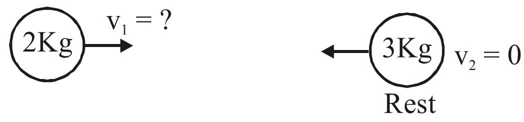
$n_i^2 = N_D \times N_A$

$N_A = \frac{n_i^2}{N_D}$

37. Before collision



After collision



By conservation of linear momentum

$2(4) + 3(-4) = 2v_1$

$8 - 12 = 2v_1$

$-4 = 2v_1$

$\boxed{v_1 = -2\ m/s}$

38. **1st case:** As it is a series combination,

$K_s = \frac{2K_1K_2}{K_1 + K_2}$

2nd case: As it is a parallel combination,

$K_p = (K_1 + K_2)/2$

$\therefore \quad \frac{K_s}{K_p} = \frac{4K_1K_2}{(K_1+K_2)^2}$

40. $\beta = \frac{i_C}{i_B}$

$i_C = \beta\ i_B = 100 \times 5 \times 10^{-6}$

$V_{out} = i_C \times R_0 = 5 \times 10^{-4} \times 10 \times 10^{-3} = 5V$

46. $Mg(OH)_2 \rightleftharpoons Mg^{+2} + 2OH^-$

$\qquad\qquad S' \qquad 2S'$

$Mg(NO_3)_2 \rightarrow Mg^{+2} + 2NO_3^{-1}$

$\qquad\qquad C \qquad 2C$

Ksp of $Mg(OH)_2 = [Mg^{+2}]\ [OH^-]^2$

$1.8 \times 10^{-11} = (S' + C)\ (2S')^2$

$1.8 \times 10^{-11} = C \times 4S'^2$

$(S') = \left(\frac{1.8\times10^{-11}}{4\times0.02}\right)^{1/2} \frac{mol}{L}$

$S' = \left(\frac{1.8\times10^{-11}}{4\times0.02}\right)^{1/2} \times 58\ g/L$

50. $Kp_1 = 8 \times 10^{-2} = PCO_2$

$$Kp_2 = \frac{P_{CO}^2}{P_{CO_2}}$$

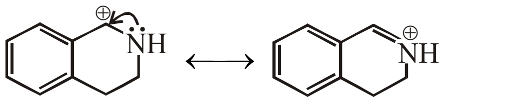
54. $5H_2O\ (\ell) \rightleftharpoons 5\ H_2O(g)$

$\Delta H = \Delta E + \Delta ng\ RT$

$540 \times 90 = \Delta E + 5\ (2) \times 373$

55. $(H_2SO_4)N_1V_1 = N_2V_2 = N_2V_2$ (dilute acid)

$N_2 = (10 \times 36)/1000 = 0.36\ N$

58. 

most stable

Complete octel Resonating structure

All other carbocations have incomplete octel resonating structure.

59. $N = \dfrac{6 \times 1000}{40 \times 100} = 1.5\ N$

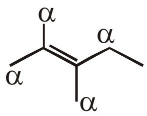
It is show highest normality than others

62. Heat of Hydrogenation $\propto$ Number of π bond

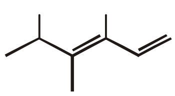
$\propto \dfrac{1}{\text{Stability}}$ (if number of π bond same)

stability $\propto$ Resonance

$\propto$ No of α–H

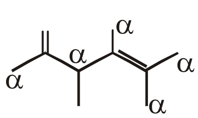


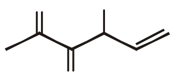
* min π bond
* min. heat of hydrogenation



Resonance stablised

$\therefore$ less heat of Hydrogenation than (III)





* max. π bond

$\therefore$ max. Heat of Hydrogenation

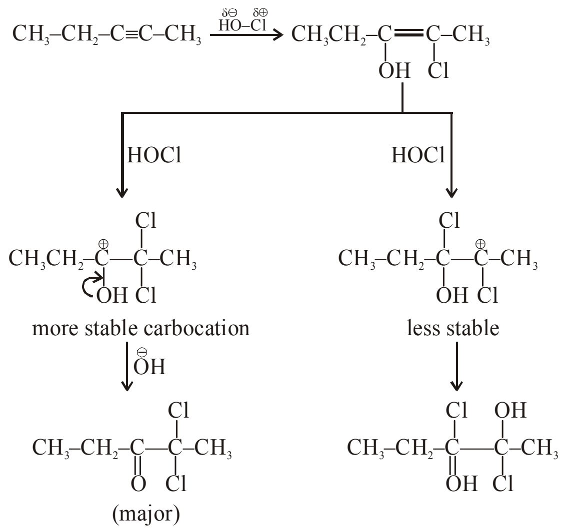
63. When cation shifts from lattice to interstitial site, the defect is called Frenkel defect.

65. Valency of metal (x) $= \dfrac{2VD}{EW + 35.5}$

$$x = \frac{80}{4.5 + 35.5} = 2$$

$$EW = \frac{Atwt}{x}$$

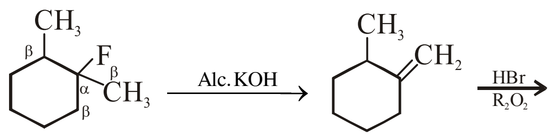
$$4.5 = \frac{Atwt}{2}$$

66. 

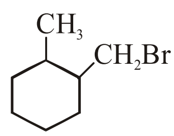
67. Order of reaction is sum of the power raised concentration terms to express rate expression

69. $\dfrac{1}{\lambda} = Z^2R\left[\dfrac{1}{n_1^2} - \dfrac{1}{n_2^2}\right]$

$$\frac{1}{\lambda} = (1)^2R\left[\frac{1}{(2)^2} - \frac{1}{(3)^2}\right]$$

70. 

(major)



(major)

(anti maukovnikov addition)

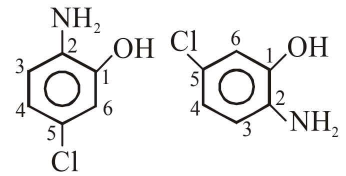
71. The concentration of reactant does not change time for zero order reaction (unit of K suggests order) since rectant is in excess

73. Bond energy of C–H bond = $\frac{400}{4}$

$= 100$ kCal/mol

Bond energy of C-C + bond energy of 6C-H bonds $= 670$

Bond energy of C-C $= 670 - 6 \times 100 = 70$ kCal

74. 

$\longrightarrow$ Indentical

75. It connect two solution and complete the circuit.

79. H_2 undergoes oxidation and AgCl(Ag^+) undergoes reduction.

86. NCERT Pg.# 197,198

87. Module, Page : 179

91. NCERT, Page : 126

94. NCERT Pg.# 231,232

101. NCERT -I Pg.# 56 & 57

103. NCERT Pg # 176

104. NCERT XII, Pg.#89 (E), 97 (H)

108. NCERT XII, Pg.#288, 289 (E), 314,315 (H)

109. NCERT XI Pg.# 142 Para 2

112. NCERT XII, Pg.#81, 82 (E), 89,90,91(H)

116. NCERT XII, Pg.#187 (E), 204(H)

134. Statement 1 is false because constructive interference can be obtained if phase difference of sources is 2π, 4π , 6π, etc.

155. I and II are structural isomers because connectivity is different

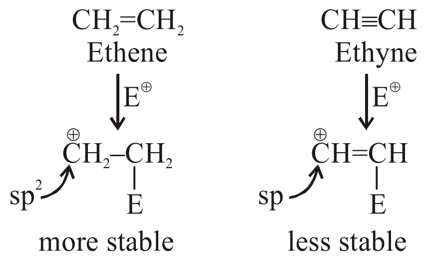
157. It is not necessary that a good base is always a good nucleophile

For example :

Basic strength $\rightarrow \overset{\ominus}{O}H > \overset{\ominus}{S}H$

Nucleophilicity $\rightarrow \overset{\ominus}{O}H < \overset{\ominus}{S}H$

159. Ethene is more reactive than ethyne towards electrophilic addition reaction because intermediate carbocation in ethene is more stable than ethyne



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171. NCERT Pg.# 248

176. NCERT XII, Pg.# 196,197(E), 213, 214 (H)

178. NCERT XII, Pg.# 89(E), 97,98 (H)

180. NCERT XII, Pg.# 213(E), 232 (H)