MAJOR TEST # 10

ALLEN NEET-UG	DATE : 01 - 05 - 2013

FULL SYLLABUS

ANSWER KEY

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

HINT – SHEET

1. Lyman series produces U.V. radiation
Balmer series produces Visible radiation
Pachan series produces Infrared radiation
So correct answer is $4 \to 3$

2. Active fraction at instant t_2, $\frac{1}{2^{t_2/T_{1/2}}} = \frac{1}{3}$

Active fraction at instant t_1, $\frac{1}{2^{t_1/T_{1/2}}} = \frac{2}{3}$

$$\Rightarrow \frac{2^{t_2/T_{1/2}}}{2^{t_1/T_{1/2}}} = 2 \Rightarrow 2^{\frac{t_2 - t_1}{T_{1/2}}} = 2^1$$

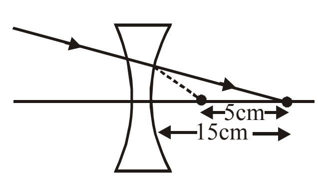
$\Rightarrow t_2 - t_1 = T_{1/2} = 50$ days

3. By using $v^2 = u^2 + 2as$ where $v = 0$, $u = 2$ m/s, $a = -\mu g = -5$ m/s^2 we have $s = 0.4$ m

4. $n \propto \sqrt{T} \Rightarrow \frac{\Delta n}{n} = \frac{1}{2}\frac{\Delta T}{T} \Rightarrow \frac{\Delta T}{T} = 2\left(\frac{\Delta n}{n}\right)$

$$= 2\left(\frac{6}{600}\right) = 0.02$$

5.



Here $u = +10$ cm
$v = +15$ cm

By lens maker formula $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

$$\frac{1}{+15} - \frac{1}{+10} = \frac{1}{f} \Rightarrow f = -30 \text{ cm}$$

6. $I_{net} = I_{disc} - I_{removed}$

$$= \frac{1}{2}(9M)R^2 - \frac{1}{2}M\left(\frac{R}{3}\right)^2 = \frac{40}{9}MR^2$$

7. Additional kinetic energy = $TE_2 - TE_1$

$$= -\frac{GMm}{2R_2} - \left(-\frac{GMm}{2R_1}\right) = \frac{1}{2}GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

8. $h = \frac{1}{2}gt^2 \Rightarrow g = \frac{2h}{t^2}$

then $\frac{\Delta g}{g} \times 100 = \left(\frac{\Delta h}{h} + 2\frac{\Delta t}{t}\right) \times 100 = e_1 + 2e_2$

9. Energy loss in C = energy stored in L

$$\frac{1}{2}CV_1^2 - \frac{1}{2}CV_2^2 = \frac{1}{2}LI^2 \Rightarrow I = \left(\frac{C(V_1^2 - V_2^2)}{L}\right)^{1/2}$$

10. For transistor action the base region must be very thin and lightly doped & the emitter-base junction is forward biased and base-collector junction is reverse biased

11.

A	B	Y
1	1	0
0	0	1
0	1	1
1	0	1

$Y = \overline{AB}$ = (NAND)

12. option (c) and (d) are incorrect because option (c) is true only for spherically symm. bodies option (d) radius of gyration is irrelevant with C.G.

13. Power = $Fv = v\left(\frac{m}{t}\right)v = v^2(\rho Av)$

$$= \rho Av^3 = (100)(2)^3 = 800\ W$$

14. $\frac{Q}{t} = \frac{kA(T_1 - T_2)}{\ell}$

$$\frac{Q'}{t} = \frac{k\left(\frac{A}{4}\right)(T_1 - T_2)}{4\ell} = \frac{1}{16}\frac{kA(T_1 - T_2)}{\ell}$$

$\Rightarrow Q' = \frac{Q}{16}$

15. f' = f & Intensity $\propto$ Area so $I' = I - \frac{I}{4} = \frac{3I}{4}$

17. $I_g = \frac{3}{50 + 2950} \propto 30$, $I_g' = \frac{3}{50 + R} \propto 20$

$\Rightarrow \frac{50 + R}{50 + 2950} = \frac{3}{2} \Rightarrow 50 + R = 4500$

$\Rightarrow R = 4450\Omega$

18. For given conditions $mg = m\omega^2 a = ka$

$\Rightarrow a = \frac{mg}{k} = \frac{2 \times 10}{200}$

$= 0.1$ m = 10 cm

19. Solar constant = $\frac{\sigma(4\pi r^2)T^4}{(4\pi R^2)}$

$$= \frac{\sigma r^2(t + 273)^4}{R^2}$$

20. $\because x = a\sin\omega t$

$\therefore \frac{a}{2} = a\sin\omega t \qquad \Rightarrow \omega t = \frac{\pi}{6}$

$\Rightarrow \left(\frac{2\pi}{T}\right)t = \frac{\pi}{6} \qquad \Rightarrow t = \frac{T}{12}$

21. $\phi_{total} = \phi_{curved} + \phi_{plane\ surfaces} = \frac{q}{\epsilon_0}$

$\phi + 2\phi_A = \frac{q}{\epsilon_0} \Rightarrow \phi_A = \frac{1}{2}\left(\frac{q}{\epsilon_0} - \phi\right)$

22. Induced emf in primary coil

$E_P = \frac{d\phi}{dt} = \frac{d}{dt}(\phi_0 + 4t) = 4$volt

Induced emf in secondary coil

$\frac{E_S}{E_P} = \frac{N_S}{N_P} \Rightarrow \frac{E_S}{4} = \frac{1500}{50} \qquad \Rightarrow E_S = 120$volt

23. $V_A - V_B = \left[V - \left(\frac{V}{8} \times 4\right)\right] - \left[V - \left(\frac{V}{4} \times 1\right)\right]$

$= -\frac{V}{2} + \frac{V}{4} = -\frac{V}{4} \Rightarrow V_B > V_A \Rightarrow$ Ans (4)

24. $v = at + \frac{b}{t + c} \Rightarrow [c] = [t] = T$;

$[v] = [at] \Rightarrow [a] = \frac{[v]}{[t]} = LT^{-2}$;

$[b] = (LT^{-1})T = L$

25. According to question and by using COME

$$-\frac{GMm}{R+R} + \frac{1}{2}m(fv)^2 = 0 + 0$$

$$\Rightarrow fv = \sqrt{\frac{GM}{R}} \text{ but } v = \sqrt{\frac{2GM}{R}}$$

Therefore $f\sqrt{\frac{2GM}{R}} = \sqrt{\frac{GM}{R}} \Rightarrow f = \frac{1}{\sqrt{2}}$

26. As voltage drop across 8Ω= $\sqrt{2\times 8}$

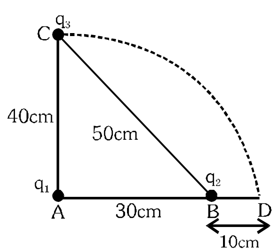
$$= 4V \left(\because P = \frac{V^2}{R}\right)$$

Therefore voltage drop across 3Ω = 3V

[∵ 4V is divided in ratio of resistances between 1Ω and 3Ω]

Hence power dissipated in 3Ω = $\frac{(3)^2}{3}$ = 3 watt

27. Energy of photon = $\frac{12400}{4100} \approx$ 3eV

28. 

$$U_i = \frac{1}{4\pi\epsilon_0}\left[\frac{q_1q_3}{(0.4)} + \frac{q_1q_2}{(0.3)} + \frac{q_2q_3}{(0.5)}\right]$$

$$U_f = \frac{1}{4\pi\epsilon_0}\left[\frac{q_1q_3}{(0.4)} + \frac{q_1q_2}{(0.3)} + \frac{q_2q_3}{(0.1)}\right]$$

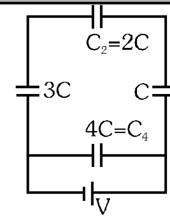
Therefore $\Delta U = U_f - U_i = \frac{1}{4\pi\epsilon_0} q_2q_3 \left(\frac{1}{0.1} - \frac{1}{0.5}\right)$

$$= \frac{q_2q_3}{\pi\epsilon_0}(10^{-2}) = \frac{q_3}{4\pi\epsilon_0}(8q_2)$$

$\Rightarrow$ K = $8q_2$

29. $B = \frac{\mu_0 I}{2R} = \frac{\mu_0}{2R}\left(\frac{e}{T}\right) = \frac{\mu_0}{2R}\left(\frac{ev}{2\pi R}\right)$

$$\Rightarrow R^2 = \frac{\mu_0 ev}{4\pi B} \Rightarrow R \propto \sqrt{\frac{v}{B}}$$

31. 

$Q_4 = 4CV$

$Q_2 = \left(\frac{6}{11}C\right) V = \frac{6CV}{11}$

$$\Rightarrow \frac{Q_2}{Q_4} = \frac{6CV}{11} \times \frac{1}{4CV} = \frac{3}{22}$$

33. PV = μRT where $\mu = \frac{5}{32}$ moles

34. $\Delta U = \mu C_V \Delta T$ & $0 = W + \Delta U$

$\Rightarrow \Delta U = -6R$ (∵ W = 6R)

Therefore $-6R = 1\left(\frac{R}{\gamma - 1}\right)\Delta T = \frac{3}{2}R\Delta T$

$\Rightarrow \Delta T = -4 \Rightarrow T_{final} = (T-4)K$

35. Let time of flight be T then $T = \frac{u}{g}$

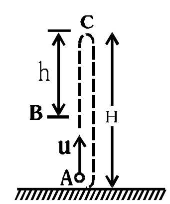
Let h be the distance covered during last 't' second of its ascent

Velocity at point B = $v_B = u - g(T-t)$

$= u - g\left(\frac{u}{g} - t\right) = gt$

$\Rightarrow h = v_Bt - \frac{1}{2}gt^2$

$\Rightarrow h = gt^2 - \frac{1}{2}gt^2 = \frac{1}{2}gt^2$



36. Here $\frac{dv}{dt}$ = constant = a (say)

Use $v^2 = u^2 + 2as$ where

s = 2 × 2πr =80 m, **u** = 0, **v** = 80 m/s

37. $(\vec{A}+\vec{B}).(\vec{A}-\vec{B}) = 0$

$\Rightarrow A^2 - \vec{A}.\vec{B} + \vec{B}.\vec{A} - B^2 = 0$

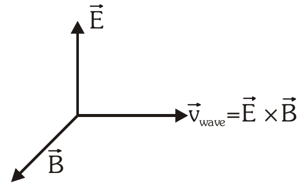
$\Rightarrow A = B$ (∵ $\vec{A}.\vec{B} = \vec{B}.\vec{A}$)

38. Source is stationary ⇒ λ = constant & $f' = \frac{v+v_s}{v}$

$$f = \left(1+\frac{v_s}{v}\right)f = \left(1+\frac{1}{5}\right)f = 1.2f$$

39. Use $\eta = 1 - \frac{T_2}{T_1} = \frac{W}{Q}$

40. For electromagnetic wave



46. We know that
oxidising nature ∝ S.R.P.
Reducing nature $\propto \frac{1}{\text{S.R.P.}}$
→ In the given values, F_2 has highest S.R.P. therefore it is strongest oxidising agent.
→ In the given values Iodine has least S.R.P. therefore I^- is strongest reductant

47. O^{-2} ions form CCP, therefore 4 O^{-2} ions are present per unit cell.
∴ No. of tetrahedral voids = 8
Tetrahedral voids occupied by $A^{+2} = \frac{1}{4} \times 8 = 2$
Also, no. of octahedral voids present = 4
Octahedral voids occupied by $B^+ = 4$
∴ Formula of oxide could be = $A_2B_4O_4$
or AB_2O_2

48. Orbital angular momentum of a p-electron is given by = $\sqrt{\ell(\ell+1)}\ \frac{h}{2\pi}$

$= \sqrt{1(1+1)}\ \frac{h}{2\pi}$

$= \sqrt{2}\ \frac{h}{2\pi}$

$= \frac{1}{\sqrt{2}}\ \frac{h}{\pi}$

49. $\frac{r_B}{r_A} = \sqrt{\frac{M_A}{M_B}} = \frac{V_B / t_B}{V_A / t_A} \Rightarrow \sqrt{\frac{49}{M_B}} = \frac{20}{10}$

$M_B = 12.25$ u

50. Molarity (M) = $\frac{\text{wt}}{\text{mol.wt.}} \times \frac{1000}{\text{vol (ml)}}$

$= \frac{25.3}{106} \times \frac{1000}{250}$

= .955 mol/L of Na_2CO_3

and $Na_2CO_3 \longrightarrow 2Na^+ + CO_3^{-2}$

therefor $[Na^+] = 2 \times 0.955 = 1.910$ M

$[CO_3^{-2}] = 0.955$ M

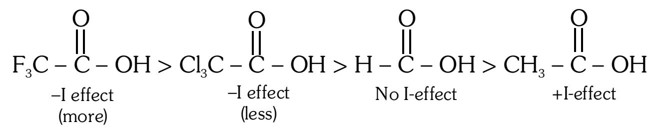
51. No of atoms = No. of molecules × atomicity
$= 0.1 \times N_A \times 3$
$= 1.806 \times 10^{23}$

56. For the cell reaction
$Fe + 2Fe^{3+} \rightarrow 3Fe^{2+}$
Anode reaction is
$Fe \rightarrow Fe^{2+} + 2e^-$
cathode reaction is
$2Fe^{3+} + 2e^- \rightarrow 2Fe^{2+}$

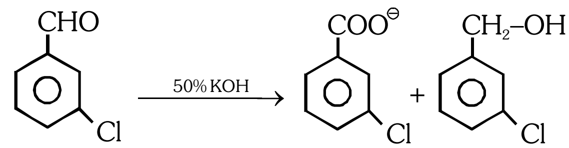
$E^\circ_{Cell} = E^\circ_{Cathode} - E^\circ_{Anode}$ (E° is reduction potential)
$= 0.771 - (-0.441)$

$E^\circ_{Cell} = 1.212V$

61.



62.

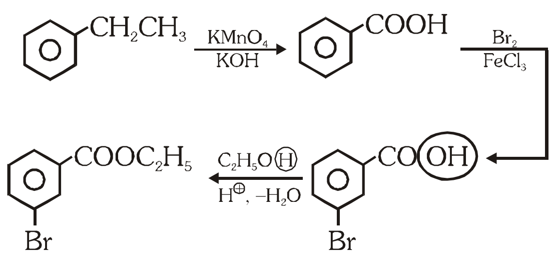


63. Vitamin B complex

64. S_{N^2} Reaction does not involve rearrangement

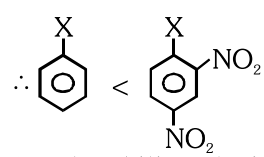
65. $\overset{5}{H_3C}-\overset{4}{CH}=\overset{3}{CH}-\overset{2}{C}\equiv\overset{1}{CH}$
Pent-3-en-1-yne

66.



67. $2HCHO \xrightarrow{\text{conc. NaOH}} HCOONa + CH_3OH$
(No formation of C–C bond)

68. (Nucleophilic substitution of aryl halide) ∝ –M effect



(Nucleophilic substitution of alkyl halide) ∝ stability of carbonium ion
∴ $(CH_3)_3C–X > (CH_3)_2CH–X$

71. In the ClF_3, Cl atom is sp^3d hybridised, having trigonal bipyramidal geometry, in which axial bonds are longer than equitorial bonds.

77. Given ions

	(i) C_2^{2-}	(ii) He_2^+	(iii) O_2^-	(iv) NO
Total e^-	14	3	17	15
Bonding e^-	10	2	10	10
Anti	4	1	7	5

bondinge^-

B.O. $\frac{10-4}{2}$ $\frac{2-1}{2}$ $\frac{10-7}{2}$ $\frac{10-5}{2}$

$= 3$ $= 0.5$ $= 1.5$ $= 2.5$

78. Down the group in Gr –16 hydrides

M–H bond length increases (due to increases in size)

Hence acidic nature increases

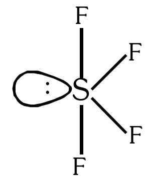
Hence Ka↑ while pKa↓

79. because $Na_2Cr_2O_7$ is hygroscopic hence give less priority.

80. On strong heating only Li gives normal oxide while other alkali metlas gives peroxide or super oxide

82. $Na \underset{\text{e gain enthalpy } -5-1}{\overset{5.1\text{eV } I\epsilon_1}{\rightleftharpoons}} Na^+$ hence 'e' gain enthalpy of Na^+ is 5.1 eV

83. Due to +ve charge on central atom, absence of synergic bond makes. C– O bond strongest.

84. In SF_4 no. of ep = 

bp + ℓp = ep

4 + 1 = 5

Hybridisation = sp^3d

86. In isoelectronic series

On increasing Zeff radius decreases

87. In $BeSO_4$ H.E. > L.E. ($\therefore$ Soluble in water)

CORRECTION IN MAJOR TEST

Test Date	PHASE						
30-03-2013	MLP,MLQ,MLR,MLS	Q.	54				
		A.	2				
06-04-2013	MLP,MLQ,MLR,MLS	Q.	58	86			
		A.	3,4	2			
11-04-2013	Leader + Enthuse + Achiever	Q.	54	70			
		A.	B	3			
20-04-2013	Leader + Enthuse + Achiever	Q.	52	84			
		A.	B	1,2			
25-04-2013	Leader + Enthuse + Achiever	Q.	100	102	103	110	144
		A.	3(H)	B	1	B	3
		Q.	152				
		A.	B				
28-04-2013	Leader + Enthuse + Achiever	Q.	8	16	30	36	51
		A.	3	4	4	3	1
		Q.	144	161			
		A.	3	3			