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UTS-NEET TEST SERIES HINTS & SOLUTION

TEST - 01 - 2017

CODE -B ACD020317

[PHYSICS]

1. (D) velocity of light in vacuum $c = \frac{1}{\sqrt{\mu_0 \epsilon_0}} = \frac{E_0}{B_0}$

velocity of light in medium $v = \frac{1}{\sqrt{\mu \epsilon}} = \frac{E}{B}$

2. (C) All except longitudinal strain are having dimensional formula

$$E = \frac{MLT^{-2}}{L^2} = [ML^{-1}T^{-2}]$$

Dimensional formula of strain = $[M^0L^0T^0]$

3. (D) Significant figures do not change while converting from one system of unit into another so it will remain same

4. (A) $1J = [ML^2T^{-2}]$

$$= \frac{kgm^2}{s^2}$$

$1J = \text{Force} \times \text{displacement}$

$= m \times \text{acceleration} \times \text{displacement}$

$= m \times (a)^2 t^2$

$= 1 kg (10)^2 \times (60)^2$

$= 10^2 \times 36 \times 10^2$

$= 3.6 \times 10^5$

5. (A) $F = P^a V^b T^c$

$F = K [P^a] [V^b] [T^c]$

$$[MLT^{-2}] = \left[\frac{F}{A} \right]^a [LT^{-1}]^b [T]^c$$

$$= \left[\frac{MLT^{-2}}{L^2} \right]^a [L^b T^{-b+c}]$$

$$= [M^a L^{-a} T^{-2a}] [L^b T^{-b+c}]$$

$$[M^a L^{-a+b} T^{-2a-b+c}]$$

by comparing LHS & RHS

$a = 1$

$-a + b = 1, \quad b = 2$

$-2a - b + c = -2$

$-2 - 2 + c = -2$

$c = 2$

$F = PV^2T^2$

Alternative Solution

$$P = \frac{F}{A}$$

Units of A : m^2 , V : m/s

$F = PA$

$= P(VT)^2 \quad VT : m$

$F = PV^2T^2$

6. (B) $y = ab$

By simple definition of

Percentage error

$$\frac{\Delta Y}{Y} \times 100 = \frac{\Delta a}{a} \times 100 + \frac{\Delta b}{a} \times 100$$

7. (B) As per the definition

8. (B) $X_m = \frac{I}{H} = \frac{\text{intensity of magnetisation}}{\text{magnetising field}}$

= unitless

$\phi_B = \text{magnetic flux}$

$$\text{emf} = \frac{-d\phi}{dt}$$

$$d\phi = \text{emf} \times \text{time} \quad \frac{U}{q} = V = E$$

$$= \frac{J}{c} s = \frac{J}{(c/s)} = \frac{J}{A}$$

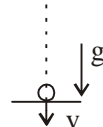
$= JA^{-1}$

9. (A) As per the formula $V_{av} = \frac{\int v dt}{\int dt} = \frac{g}{2}$

$$\int_0^T g dt = \frac{g}{2} \int_0^T dt$$

$$g \frac{T^2}{2} = \frac{g}{2} T$$

$$\text{---} \circ \text{---} \quad u = 0$$



$$T^2 - T = 0$$

$$T = 1, T = 0$$



Consider $T = 1$

$$\therefore v = u + at$$

$$-v = 0 - gT$$

$$v = g(1) = g$$

10. (D) Velocity keeps decreasing with uniform rate and then its magnitude starts increasing with same rate

[uniform retardation could also be the answer]

Here (d) is correct answer.

11. (A) $V_{b \rightarrow g} = 3i + 4j$

$$V_{r \rightarrow e} = -3i - 4j$$

$$\begin{aligned} V_{b \rightarrow r} &= V_b - V_r \\ &= V_{b \rightarrow g} - V_{r \rightarrow g} \\ &= 3i + 4j - (-3i - 4j) \\ &= 6i + 8j \end{aligned}$$

12. (B) $t = \frac{u}{g} = \text{time of ascent}$

$$\frac{u}{g} = 2$$

$$\begin{aligned} u &= 2g = 2 \times 9.8 \text{ m/s} \\ &= 19.6 \text{ m/s} \end{aligned}$$

13. (B) $y = Ax - bx^2$

$$R = \frac{\text{coefficient of } x}{\text{coefficient of } (-x^2)} = \frac{A}{B}$$

or

$$y = x \tan \phi \left(1 - \frac{x}{R} \right)$$

$$y = Ax \left(1 - \frac{x}{A/B} \right)$$

comparing above equations $R = A/B$

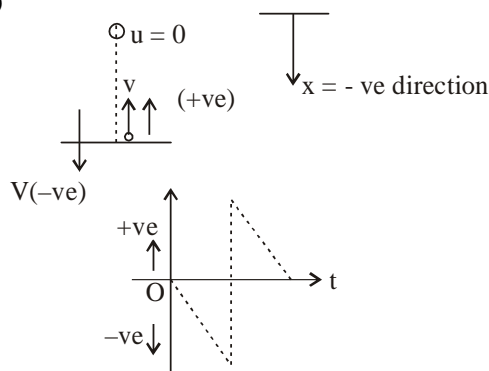
14. (A) $R = 4H \tan \theta$

($R = \text{range}, H = \text{Maximum height}$)

$$R = \frac{u^2}{g} = \frac{20 \times 20}{10}$$

$$R = 40 \text{ m}$$

15. (D)



16. (B)
-
- $u \rightarrow \quad \rightarrow a \quad \rightarrow \quad V = 45 \text{ m/s}$
- $\circ \quad \quad \quad \circ$
- $1 \quad \quad \quad 2$
- $\leftarrow 180 \text{ m} \rightarrow$

$$V = u + at$$

$$45 = u + 6a \quad \dots(1)$$

$$s = ut + \frac{1}{2}at^2$$

$$180 = u(6) + \frac{1}{2}a(6)^2$$

$$180 = 6u + 18a$$

$$60 = 2u + 6a \quad \dots(2)$$

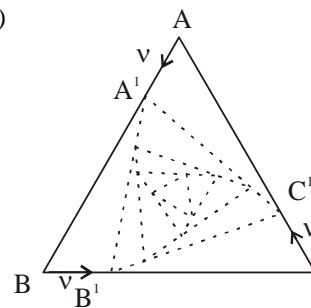
$$45 = u + 6a$$

$$15 = u$$

17. (B) Time of ascent = time of descent
(in case of no air resistance)

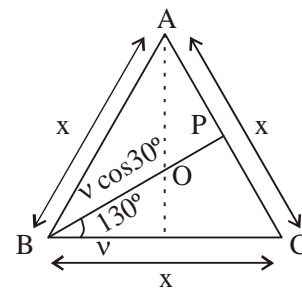
$$t = 10 \text{ s}$$

18. (A)



The motion of all three persons will be as above. They will always be at the vertices of an equilateral triangle and finally meet at centroid.

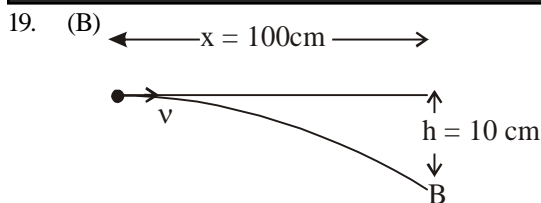
The above problem can be solved by assuming that a person has to reach at centroid



$$BP = x \cos 30^\circ = x \frac{\sqrt{3}}{2}$$

$$BO = \frac{2}{3}BP = \frac{2}{3} \left(x \frac{\sqrt{3}}{2} \right) = \frac{x}{\sqrt{3}}$$

$$t_{BO} = \frac{BO}{v \cos 30^\circ} = \frac{x / \sqrt{3}}{v \frac{\sqrt{3}}{2}} = \frac{2x}{3v}$$



$$h = \frac{1}{2}gt^2 \quad x = vt$$

$$= \frac{1}{2}g\left(\frac{x}{v}\right)^2 \quad t = \frac{x}{v}$$

$$\frac{10}{100} = \frac{1}{2} \times 19.8 \times \frac{1}{v^2}$$

$$v^2 = 4.9 \times 10$$

$$v = 7 \text{ m/s} = 700 \text{ cm/s}$$

20. (C) Check option (c)

$$R_{\max} = 2H + \frac{R^2}{8H} = \frac{2u^2 \sin^2 \theta}{2g} + \frac{u^4 \sin^2 2\theta \cdot 2g}{g^2 8u^2 \sin^2 \theta}$$

$$= \frac{u^2 \sin^2 \theta}{g} + \frac{u^4 4 \sin^2 \theta \cos^2 \theta \cdot 2g}{g^2 8u^2 \sin^2 \theta}$$

$$= \frac{u^2 \sin^2 \theta}{g} + \frac{u^2 \cos^2 \theta}{g} = \frac{u^2}{g}$$

Maximum range is obtained at 45°

\therefore Option (c) correct

21. (D) $AB \cos \theta = \frac{\sqrt{3}}{2} AB$

$$\cos \theta = \frac{\sqrt{3}}{2} \quad \therefore \quad \phi = \frac{\pi}{6} \text{ rad}$$

22. (A) For the physical quantity to be a vector it must obey the law of vector addition hence reason is correct explanation of assertion.

23. (B) $\overrightarrow{PQ} = (5\hat{i} - 2\hat{j} + 4\hat{k}) - (\hat{i} + 3\hat{j} - 7\hat{k})$

$$= 4\hat{i} - 5\hat{j} + 11\hat{k}$$

$$|\overrightarrow{PQ}| = \sqrt{4^2 + 5^2 + 11^2} = \sqrt{162}$$

24. (D) Since the point of application of force does not move hence work done is zero.

25. (B) Velocity will interchange.

Change in momentum of the particle at rest initially is μ

$$\Delta P = P_{\text{final}} - P_{\text{initial}} = \mu - 0 = \mu$$

$$\Delta P = \text{Impulse}$$

$$\mu = \frac{1}{2}TF_0$$

$$F_0 = \frac{2\mu}{T}$$

26. (B) $F = N \frac{\Delta P}{\Delta t} = N \frac{mv}{\Delta t} \quad \left[\frac{N}{\Delta t} = 200 \right]$

$$= 200 \times 0.03 \times 30 = 180 \text{ Newton}$$

27. (D) $a = \frac{mg}{m+m} = \frac{g}{2} = 5 \text{ m/s}^2 \quad (\because m = 1 \text{ kg})$

For the hanging mass

$$1a = 1g - T$$

$$T = 5 \text{ Newton}$$

28. (B) To lift block up $T = Mg$

For boy $ma = T - mg$

$$ma = Mg - mg$$

$$a = \left(\frac{M}{m} - 1 \right) g$$

29. (B) $I = \int_0^4 (10 + 2t) dt = 10t + t^2 \Big|_0^4 = 56 \text{ Ns}$

30. (B) Action & reaction forces are always equal and opposite. Therefore the reaction force should also be gravitational

31. (A) $\vec{P} = m\vec{V}$

\therefore Momentum is always along its velocity

32. (B) Option (b)

(A) Electrons revolving in orbit possess both KE and P.E

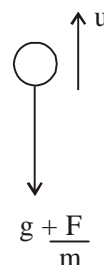
(B) Bent Bow has elastic P.E. stored in it.

(C) Flowing water has K.E.

(D) Freely suspended massless spring has no extension hence has no energy.

33. (A) $F =$ resistive force

$$H = \frac{u^2}{2g_{\text{eff}}}$$



$$H_x = \frac{u^2}{2\left(g + \frac{F}{m_x}\right)} \quad H_y = \frac{u^2}{2\left(g + \frac{F}{m_y}\right)}$$

$$H_x > H_y$$

34. (C) When the man jumps he exerts force on the platform over and above his own weight

35. (C) (A) Apparent weight = $m(g+a)$

$$\text{True weight} = mg$$

(B) Apparent weight = $m(g-a)$

(C) Apparent weight = True weight

(d) Apparent weight = $m(g-g) = 0$

36. (C) Retardation remains same

$$v - u^2 = 2as$$

$$0 - 10^2 = 2 \times a \times 5$$

$$0 - 20^2 = 2aS$$

Dividing both equations

$$S = 20\text{m}$$

37. (D) $P = \frac{mgh}{\Delta t} = \frac{1200 \times 200}{4 \times 60} = 1000\text{W}$

38. (A) $Ma_0 = F - Kx$

$$ma = Kx$$

$$Ma_0 = F - ma$$

$$a_0 = \frac{F - ma}{M}$$

39. (A) $\frac{80}{100} mgh_1 = mgh_2$

$$\frac{4}{5} \times 100 = h_2$$

$$h_2 = 80\text{m}$$

40. (B) $W.d = \Delta KE$

$$\vec{F} \cdot \vec{S} = \frac{1}{2}mv^2 - \frac{1}{2}mu^2$$

$$8 + 3 - 10 = \frac{1}{2}2V^2$$

$$V = 1\text{m/s}$$

41. (C) At highest point the kinetic energy is zero hence total energy is only potential

42. (D) $\frac{du}{dx} = -F$

It represents force that is weight. The given quantity should have limit of force.

43. (C) $U = \frac{1}{2}Kx^2$

$$2 = \frac{1}{2}K(4 \times 10^{-2})^2$$

$$K = 2500\text{N/m}$$

$$F = Kx = 2500 \times 8 \times 10^{-2} = 200\text{N}$$

44. (A) $P = \vec{F} \cdot \vec{V}$

$$= 50 + 30 + 120 = 200\text{W}$$

45. (C) $v = \sqrt{KS}$

$$\int \frac{ds}{\sqrt{s}} = \int \sqrt{K} dt$$

$$2\sqrt{s} = \sqrt{K}t$$

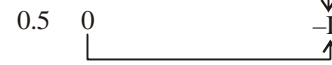
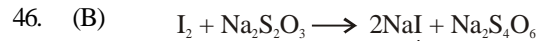
$$s = \frac{kt^2}{4} \Rightarrow v = \frac{Kt}{2}$$

$$W = \Delta KE$$

$$= \frac{1}{2}mv^2 - \frac{1}{2}mu^2$$

$$= \frac{mK^2t^2}{8}$$

[CHEMISTRY]



$$\begin{aligned} \text{No. of } e^- \text{ gained} &= 2 \times 1 \\ &= 2 \end{aligned}$$

$$\text{Eq.wt} = \frac{\text{mol.wt}}{\text{n.factor}}$$

n-factor \rightarrow change in oxidation state

$$\text{So. eq. wt of Iodine is} = \frac{\text{M.W.}}{2}$$

47. (B) Atomic wt. of metal =

$$\frac{\text{no. of atom of oxygen} \times 16}{\text{no. of atom of oxygen atom} \times 16 + \text{no. of atom of metal} \times \text{atomic wt.}} \times 100 = \% \text{ of oxygen in oxide}$$

$$= \frac{16 \times 2}{16 \times 2 + x} \times 100 = 50$$

$$= \frac{3200}{32 + x} = 50 \Rightarrow 3200 = 1600 + 50x$$

$$50x = 1600$$

$$x = 32$$

in 2nd oxide : 60% oxygen, 40% metal

$$\text{moles of metal} = \frac{40}{32} = \frac{10}{8} = \frac{5}{4} \quad \times \quad 0$$

$$\text{Ratio} = 5 : 15$$

$$\text{mole of O} = \frac{60}{16} = \frac{15}{4} \quad \Rightarrow \quad 1 : 3$$

so formula will be = XO_3

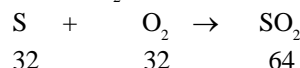
48. (B) Mass of 'S' in sample :

100 kg contain S = 1

$$1 \text{ ----- } \frac{1}{100}$$

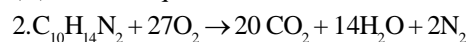
$$2 \times 10^6 \text{ ----- } \frac{1}{100} \times 2 \times 10^6 \Rightarrow 2 \times 10^4$$

wt of SO_2 produced



$$2 \times 10^4 \text{ kg} \quad 2 \times 10^4 \quad 4 \times 10^4 \text{ kg}$$

49. (C) Balance equation of nicotine



From above equation.

2 mole nicotine gives 20 mol of CO_2

.1 , , , 1 mole

$$\text{Mass of } CO_2 = 44\text{g}$$

50. (B) Weight of HCl present in 2.5 litmus solⁿ = 3 × 2.5 = 7.5 g

$$\text{mole in 7.5 g HCl} = \text{H}^+ = \frac{7.5}{36.5} = 0.205$$

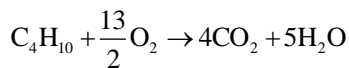
$$1 \text{ mole Al(OH)}_3 = 3 \text{ mole H}^+$$

$$\frac{0.205}{3} \text{ mol Al(OH)}_3 = 0.20 \text{ s mole H}^+$$

$$1 \text{ tablet contain} = \frac{400 \times 10^{-3}}{77} \text{ moles} \\ = 0.0051 \text{ moles}$$

$$= \frac{0.205}{3} \text{ moles contain } \square 14 \text{ tablets}$$

51. (A) $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$



$$(3-x) \qquad 4(3-x)$$

$$3x + 4(3-x) = 10$$

$$x = 2$$

$$\text{ratio of C}_3\text{H}_8 : \text{C}_4\text{H}_{10} = 2 : 1$$

52. (A) $\text{CH}_3\text{OH} = \frac{2.5 \times 0.25 \times 32 \times 10^{-3}}{0.793} = 0.025$

53. (C)

54. (B)

55. (B) Molecular weight 92 means N_2O_4

$$\Rightarrow \text{Total no. of electron in 1 } \text{N}_2\text{O}_4 \text{ molecule} = 46$$

$$\Rightarrow 1 \text{g-atom} = 1 \text{ mole } \text{N}_2\text{O}_4 \text{ molecule contain 46 N electrons}$$

56. (C)

57. (C) 0.0835 mole have 1g of hydrogen

$$1 \text{ mole have} - \frac{1}{0.0835} = 11.9 \text{ of g} = \text{hydrogen}$$

$$11.9 \square 12$$

$$\text{So, C}_6\text{H}_{12}\text{O}_6$$

58. (B) For energy we use (n + 1) Rule

$$n + 1 \text{ for (b) is 5 maximum value.}$$

59. (B) It's electronic configuration of chromium in ground state.

60. (A) Nodal plane in P_x is 1

61. (C) Diffraction is property of wave.

62. (D) Energy n = 2

$$E = \frac{13.6 \times Z^2}{n^2}$$

$$= \frac{13.6}{4} \text{ eV}$$

$$\text{For } n = 3 \qquad \frac{13.6}{9} \text{ eV}$$

$$\Delta E_{3 \rightarrow 2} = \frac{13.6}{4} - \frac{13.6}{9} = 1.9 \text{ eV}$$

63. (A) Visible range means Balmer series. Transition would be $n_3 \rightarrow n_2$

64. (C) Energy emitted is 12.1 eV. It means transition's from

$$n = 3 \rightarrow 1. \text{ Angular momentum} = \frac{nh}{2\pi}, \quad n = 3 \frac{3h}{2\pi}$$

$$n = 1, \quad \frac{h}{2\pi}$$

$$\text{change } \frac{3h}{2\pi} - \frac{h}{2\pi} = \frac{h}{\pi}$$

65. (C) X-ray are neutral

66. (B) Energy required to dissociated one I_2 molecule

$$= \frac{240 \times 10^3}{6.023 \times 10^{23}}$$

67. (A) work function of metal = $\frac{hc}{\lambda_0} = \frac{6.6 \times 10^{-34} \times 3 \times 10^8}{310 \times 10^{-9}}$

$$\text{K.E emitted} = 36 \times 10^{-20}$$

$$\text{Total energy} = \phi + \text{K.E}$$

$$\text{Total energy} = \frac{hc}{\lambda} = h\nu$$

$$\nu = 1.5 \times 10^{15} \text{ Hz}$$

68. (A) In Balmer series $\frac{1}{\lambda} = RZ^2 \left[\frac{1}{n_1^2} - \frac{1}{n_2^2} \right]$

$$\frac{1}{\lambda} = R \times 4 \left[\frac{1}{4} - \frac{1}{16} \right]$$

$$= R \times 4 \left[\frac{3}{16} \right] = \frac{3}{4} R$$

$$\text{check option} \qquad \frac{1}{\lambda} = R \times 1^2 \left[1 - \frac{1}{4} \right] = \frac{3}{4} R$$

So, option (a) is correct

69. (B) $\frac{\lambda_1}{\lambda_2} = \sqrt{\frac{2m_2 K.E_2}{2m_1 K.E_1}}$

70. (B)

71. (A) energy of one photon = $\frac{hc}{\lambda} = \frac{6.6 \times 10^{-34} \times 3 \times 10^8}{4500 \times 10^{-10}} \text{ J}$

$$4.4 \times 10^{-19} \text{ J}$$

$$\text{Power of Bulb} = 150 \text{ watt}$$

$$150 \text{ watt} = 150 \text{ J sec}^{-1}$$

$$\text{Actual energy emitted} =$$

$$100 \text{ ————— } 8$$

$$1 \text{ ————— } \frac{8}{100} \times 150 = 12 \text{ J}$$

$$\text{Total energy emitted} = \text{no. of photon} \times \text{energy of one photon}$$

$$E = n \times h\nu$$

$$n = \frac{12}{4.4 \times 10^{-14}} = 27.2 \times 10^{19}$$

72. (A) $\Delta x \times m\Delta v = \frac{h}{4\pi}$

$$100 \times 0.005$$

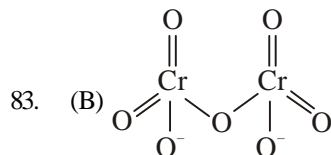
$$1 \times \frac{0.005}{100} \times 600$$

$$= 0.03$$

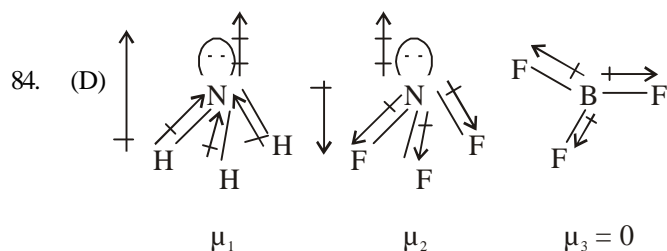
$$\Delta x = \frac{6.6 \times 10^{-34}}{9.1 \times 10^{-31} \times 0.3 \times 4 \times 3.14}$$

$$= 1.96 \times 10^{-3}$$

73. (B) metallic character $\propto \frac{1}{\text{I.E.}}$
74. (D) I.E of P is more than S due to half filled orbital of P
75. (B) I.E of N is more than oxygen due to half filled orbital.
76. (D) Diagonal relationship
 Li \rightarrow Mg
 Be \rightarrow Al
 B \rightarrow Si
77. (A) I, II & III are correct
78. (B) In periodic table from left to right Acidic strength increases
79. (D) Sn & Zn oxide are amphoteric oxide
80. (A) Factural
81. (D) Aluminium have 3 valence e^- after removal of $3e^-$. It got noble gas configuration.
82. (C)



Terminal 3Cr-O bond from each side are in resonance due to which 6Cr-O bonds are equivalent



$$= \mu_1 > \mu_2 > \mu_3$$

85. (B)
86. (C)
87. (D) N_2^{\oplus} is paramagnetic due to presence of unpaired electron.
88. (B) Overlapping between d-orbital of phosphorous and p orbital of oxygen atom
89. (B) O_2^{2-} does not contain any unpaired electron
90. (C) Hydrogen is covalently bonded with most electronegative atom

