



AVIRAL CLASSES

IIT-JEE | NEET | FOUNDATIONS

ULTIMATE TEST SERIES NEET -2019

TEST-1 SOLUTION

Test Date :01-03-2020

[PHYSICS]

1. $y = 5x^2 - 2x + 1$

$$\frac{dy}{dx} = 10x - 2 \quad 10x - 2 = 0 \quad x = \frac{1}{5}$$

$$\frac{d^2y}{dx^2} = 10 \quad y_{\min} = 5\left(\frac{1}{5}\right)^2 - 2\left(\frac{1}{5}\right) + 1 = \frac{4}{5}$$

2. $S_{n^{\text{th}}} = u + \frac{a}{2}(2n - 1)$

$$S_{3^{\text{rd}}} = 10 + \frac{10}{2}(2 \times 3 - 1) = 10 + 25 = 35 \text{ m}$$

$$S_{2^{\text{nd}}} = 10 + \frac{10}{2}(2 \times 2 - 1) = 10 + 15 = 25 \text{ m}$$

$$S_{3^{\text{rd}}} : S_{2^{\text{nd}}} :: 7 : 5$$

3. $\frac{dr}{dt} = 0.1 \quad A = \pi r^2$

$$\frac{dA}{dt} = 2\pi r \cdot \frac{dr}{dt} = \frac{2\pi \times 5}{11} \times 0.1 = 0.29 \text{ cm}^2/\text{sec}$$

4. **C** In addition least number of decimal points is taken.

5. $x = 3t^2 - 6t \quad y = t^2 - 2t$

$$v_x = \frac{dx}{dt} = 6t - 6 \quad v_y = \frac{dy}{dt} = 2t - 2$$

at $t = 1 \text{ sec} \rightarrow v_x = 0 \text{ and } v_y = 0$

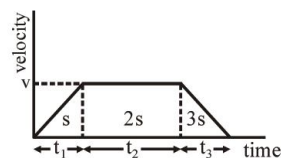
hence $v = \sqrt{v_x^2 + v_y^2} = 0$

6. Energy per unit volume, force per unit area and product of voltage & charge, per unit volume all has dimensions $[M^1L^{-1}T^{-2}]$ but angular momentum per unit mass has dimensions $[M^0L^2T^{-1}]$

7. $v_{\text{avg}} = \frac{6s}{t_1 + t_2 + t_3}$

$$v_{\text{avg}} = \frac{6s}{\frac{2s}{v} + \frac{2s}{v} + \frac{6s}{v}}$$

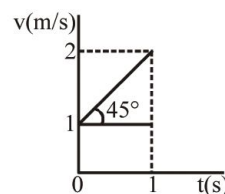
$$v_{\text{avg}} = \frac{6s \times v}{10s} \Rightarrow \frac{v_{\text{avg}}}{v} = \frac{3}{5}$$



8. $v_{\text{avg}} = \frac{\text{distance}}{\text{time}}$

$$v_{\text{avg}} = \frac{\frac{1}{2}(1+2) \times 1}{1}$$

$$= \frac{3}{2} = 1.5 \text{ m/s}$$



9. $R = 2a \cos \frac{\theta}{2} \quad 1 = 2 \times 1 \cos \frac{\theta}{2}$

$$\theta = 120^\circ$$

$$R^1 = 2a \sin \frac{\theta}{2} = 2 \times 1 \sin 60^\circ = \sqrt{3}$$

10. Let $\vec{A} = 2\hat{i} + 3\hat{j}$ and $\vec{B} = \hat{i} + \hat{j}$

Component of \vec{A} in direction of $\vec{B} = \frac{(\vec{A} \cdot \vec{B})\vec{B}}{B^2}$

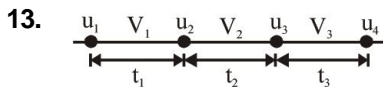
$$= \frac{(2 \times 1 + 3 \times 1)(\hat{i} + \hat{j})}{2} = \frac{5}{2}(\hat{i} + \hat{j})$$

Magnitude of component = $\frac{5}{\sqrt{2}}$

11. $R = 2a \cos \frac{\theta}{2} \quad F = 2F \cos \frac{\theta}{2}$

$$\theta = 120^\circ$$

12. $t = \frac{150 + 850}{45 \times \frac{5}{18}} = 80 \text{ sec}$



$$V_1 = \frac{u_1 + u_2}{2}, V_2 = \frac{u_2 + u_3}{2}, V_3 = \frac{u_3 + u_4}{2}$$

$$V_1 - V_2 = \frac{u_1 - u_3}{2}$$

$$V_2 - V_3 = \frac{u_2 - u_4}{2} \Rightarrow \frac{V_1 - V_2}{V_2 - V_3} = \frac{u_1 - u_3}{u_2 - u_4}$$

$$t_1 = \frac{u_2 - u_1}{a}, t_2 = \frac{u_3 - u_2}{a}, t_3 = \frac{u_4 - u_3}{a}$$

$$t_1 + t_2 = \frac{u_3 - u_1}{a}$$

$$t_2 + t_3 = \frac{u_4 - u_2}{a} \Rightarrow \frac{t_1 + t_2}{t_2 + t_3} = \frac{u_3 - u_1}{u_4 - u_2} = \frac{u_1 - u_3}{u_2 - u_4}$$

$$\text{so } \frac{V_1 - V_2}{V_2 - V_3} = \frac{t_1 + t_2}{t_2 + t_3}$$

14. C

15. B $\vec{A} \cdot (\vec{A} + \vec{B}) = \vec{A} \cdot \vec{A} + \vec{A} \cdot \vec{B} = A^2 + 0 = A^2$

$$|\vec{a} + \vec{b}| \text{ maximum} = |\vec{a}| + |\vec{b}|$$

16. B

17. $F = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2} \Rightarrow [\epsilon_0] = \left[\frac{q^2}{Fr^2} \right]$

18. $a = v \frac{dv}{dx}$

19. $m = \text{linear density} = \frac{M}{L}$

$$[B] = \left[\frac{A}{m} \right] = \left[\frac{F}{M/L} \right] = \left[\frac{FL}{M} \right] = \text{dimensions}$$

of latent heat

20. A (Energy = power × time)

21. $V = \text{slope of } x - t \text{ graph}$

If sign of v changes, then direction reverses. if $v \uparrow$, then $a > 0$ and if $v \downarrow$, then $a < 0$

22. two values of acceleration, velocity or displacement. at one particle time are not possible but two velocities are possible at one value of displacement.

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

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

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

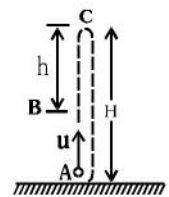
Let h be the distance covered during last 't' second of its ascent

$$\text{Velocity at point B} = v_B = u - g(T - t)$$

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

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

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



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

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

$$\Rightarrow A = B (\because \vec{A} \cdot \vec{B} = \vec{B} \cdot \vec{A})$$

27. B

$$28. \frac{3}{v_{\text{avg}}} = \frac{1}{v} + \frac{1}{2v} + \frac{1}{3v}$$

29. For avoiding collision: $v_r < 0$

$$U_r^2 + 2a_r S_r < 0 \text{ [III Eq. in of motion]}$$

$$(V_1 - V_2)^2 + 2(-a)d < 0$$

$$(V_1 - V_2)^2 < 2ad$$

$$d > \frac{(v_1 - v_2)^2}{2a}$$

30. As [Energy] = [Force × distance]

$$\text{so unit of distance} = \frac{\text{unit of Energy}}{\text{unit of force}} = \frac{5\text{J}}{10\text{N}} = 0.5\text{m}$$

31. Component of \vec{x} on $\vec{y} = x \cos \theta$

$$= \frac{\vec{x} \cdot \vec{y}}{y} = \frac{(\vec{a} - \vec{b}) \cdot (\vec{a} + \vec{b})}{|\vec{a} + \vec{b}|}$$

$$= \frac{a^2 - b^2}{\sqrt{a^2 + b^2}}$$

32. $\vec{v}_B = 2\vec{v}_A$

$$\vec{v}_{CA} = x\hat{i} \Rightarrow \vec{v}_C - \vec{v}_A = x\hat{i} \quad \dots (1)$$

$$\vec{v}_C - \vec{v}_B = x\hat{j} \Rightarrow \vec{v}_C - \vec{v}_A = x(\hat{i} - \hat{j})$$

$$\vec{v}_A = x(\hat{i} - \hat{j})$$

$$\vec{v}_C = 2x\hat{i} - x\hat{j} \quad \tan \theta = 1/2$$

33. B

$$34. \frac{\Delta p}{p} = 3 \frac{\Delta a}{a} + 2 \frac{\Delta b}{b} + \frac{1}{2} \frac{\Delta c}{c} + \frac{\Delta d}{d}$$

$$= 3 \times 1\% + 2 \times 3\% + \frac{1}{2} \times 4\% + 2\% = 13\%$$

35. A

36. C

37. D

38. B

39. C

40. C

41. B

42. A

43. Unit of impulse × time = N - sec²

$$\begin{aligned} 44. \vec{AB} + \vec{AC} &= (\vec{AO} + \vec{OB}) + (\vec{AO} + \vec{OC}) \\ &= 2\vec{AO} + \vec{OB} + \vec{OC} \\ &= 2\vec{AO} - \vec{OA} \\ &= 2\vec{AO} - \vec{AO} \\ &= \vec{AO} \end{aligned}$$

45. D

[CHEMISTRY]

$$46. E = \frac{hc}{\lambda}$$

$$\lambda = \frac{hc}{E}$$

$$\lambda = \frac{h}{p}$$

$$\frac{hc}{E} = \frac{h}{p}$$

$$p = \frac{E}{C}$$

47.

$$(\bar{v}_1)_{\text{He}^+} = y = R_H 2^2 \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right) \dots (i)$$

$$(\bar{v}_2)_{\text{Li}^{2+}} = R_H \times 3^2 \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right) \dots (ii)$$

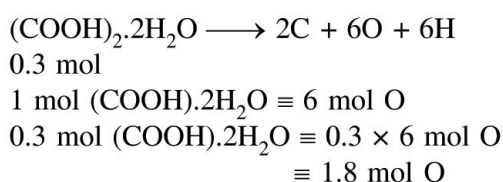
$$(ii) \div (i)$$

$$(\bar{v}_2)_{\text{Li}^{2+}} = y \times \frac{9}{4}$$

48.

In a single e^- system energy of an orbital depends only upon value of n .

49.



$$X_{\text{O}_2} = \frac{n_{\text{O}_2}}{n_{\text{O}_2} + n_{\text{O}_3}} = 0.25$$

$$X_{\text{O}_3} = \frac{n_{\text{O}_3}}{n_{\text{O}_2} + n_{\text{O}_3}} = 0.75$$

$$\% \frac{w}{w} \text{ of O}_2 = \frac{\text{wt of O}_2}{\text{wt of O}_2 + \text{wt of O}_3} \times 100\%$$

$$\frac{w_{\text{O}_2}}{w_{\text{O}_2} + w_{\text{O}_3}} \times 100 = \frac{32}{32 + 144} \times 100 = \frac{32}{176} \times 100 = 18.18$$

60.

Gram equivalents of acid = Gram equivalent of base

$$\frac{17}{E_w} = .1 \times 1$$

$$E_w = 170$$

$$M_w = 2 \times 170 = 340$$

61.

$$\Delta x = \frac{h}{4\pi \times m \times \Delta v}$$

$$= \frac{6.62 \times 10^{-34} \times 100}{4 \times 3.14 \times 9.1 \times 10^{-34} \times 600 \times 0.005} = 1.92 \times 10^{-3} \text{ m}$$

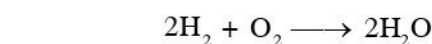
62.

Nuclei containing same number of neutrons are isotones.

63. D

64. D

65.



Initial 8gm 16gm

32 gm of O₂ - 4gm H₂16 gm of O₂ - $\frac{4}{32} \times 16 = 2 \text{ gm}$ Amount of H₂ left = 6 gm

66. C

67. D

68. C

69. A

70. A

71. C

50.

$$n\lambda = 2\pi r$$

$$\lambda = \frac{2\pi r}{n} = \frac{2 \times 3.14 \times 0.529 \times 10^{-8} \text{ cm} \times 4}{2}$$

51.

$$\frac{M \times 5}{100} = 32$$

$$M = 640$$

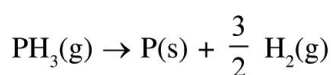
52.

$$(\text{I.E.})_{\text{H}_2} = -(\text{E}_1)_{\text{H}} = x$$

$$E \propto Z^2$$

$$\Delta E = E_5 - E_2$$

53.



100 mL

0 mL

0 mL

150 mL

$$\Delta V = 150 - 100 = 50 \text{ mL}$$

54.

Maximum value of $m_l = +3$ Value of $l = 3$ Value of $n = 4$

55.

$$V \propto \frac{Z}{n}$$

56.

Molecular formula = (empirical formula)_n

$$\therefore n = \frac{78}{13} = 6$$

57.

$$\text{Meq. of NaOH} = 10 \times 0.5 \times 2 = 10$$

$$\therefore \frac{w}{40} \times 1000 = 10$$

$$\therefore w = 0.4 \text{ g}$$

58. (3)

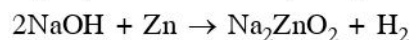
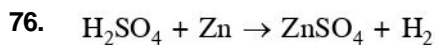
59.

72. C

73. B

74. C

75. A



77. No. of moles = $\frac{\text{Gram amount of substance}}{M_w}$

No. of atoms = no. of moles $\times N_A$

Gram amount is same for all M_w is minimum for B(s)

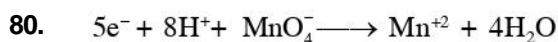
78. $n^\circ = A - Z$

for S^{35}

$n^\circ = 35 - 16 = 19$

79. If $n = 4$

$l = 0$

then $m =$ (only)

81. Orbital angular momentum of a p-electron is

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

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

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

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

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

83. A

84. B

85. It is very dilute solution of NaOH

$\therefore [\text{OH}^-]_{\text{total}} = [\text{OH}^-]_{\text{NaOH}} + [\text{OH}^-]_{\text{H}_2\text{O}}$

$[\text{OH}^-]_{\text{total}} = 10^{-7} + 10^{-7} = 2 \times 10^{-7} \text{ M}$

86. $\frac{1}{\lambda} = Rz^2 \left(\frac{1}{4} - \frac{1}{25} \right) = R \times 1 \times \left(\frac{25-4}{25 \times 4} \right) = \frac{21R}{100}$

$\lambda = \frac{100}{21R}$

87. D

88. A

89. A

90. B