SOLUTIONS

PHASE TEST-1

MGZ-1904,1905

NEET PATTERN

Test Date: 04-11-2017

Mentors Eduserv: Plot No.-136/137, Parus Lok Complex, Boring Road Crossing,
Patna-1, Ph. No. : 0612-3223680 / 81, 7781005550 / 51

PHYSICS

1. **(1)**

Magnitude of velocity = Speed

So, if the speed is zero then it must have zero velocity also.

2. **(2)**

$$a = \frac{dv}{dt} = \frac{dv}{dx}\frac{dx}{dt}$$

$$\boxed{a = \frac{vdv}{dx}}$$

3. **(3)**

Final velocity

Initial velocity

Velocity at the mid-point = $\sqrt{\dfrac{v^2 + u^2}{2}}$

(When acceleration is constant)

Given, v = 3u, u = u

So, $v_{mid} = \sqrt{\dfrac{9u^2 + u^2}{2}} = \sqrt{\dfrac{10u^2}{2}}$

$$v_{mid} = \sqrt{5u^2} = \boxed{\sqrt{5}u = v_{mid}}$$

4. **(2)**

$$x^2 = t + 2 \Rightarrow \boxed{\frac{1}{x^2} = \frac{1}{t+2}} \qquad .....(i)$$

$$\Rightarrow x = \sqrt{t+2}$$

$$\Rightarrow \frac{dx}{dt} = \frac{1}{2}(t+2)^{\frac{1}{2}-1}$$

$$\Rightarrow \frac{dx}{dt} = \frac{1}{2}(t+2)^{-\frac{1}{2}}$$

$$\Rightarrow \frac{d^2x}{dt^2} = \frac{1}{2}\left(-\frac{1}{2}\right)(t+2)^{-\frac{1}{2}-1}$$

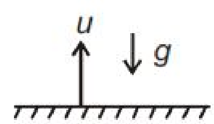
$$\Rightarrow a = -\frac{1}{4}(t+2)^{-\frac{3}{2}} = -\frac{1}{4(t+2)} \times \frac{1}{(t+2)^{\frac{1}{2}}} = -\frac{1}{4} \times \frac{1}{x^2} \times \frac{1}{x}$$

$$\Rightarrow \boxed{a = -\frac{1}{4x^3}}$$

5. **(2)**

Whether body move upwards or downwards

the earth tries to pull it downwards only.



Hence during both the motion g will negative.

So, negative, negative

6. **(3)**

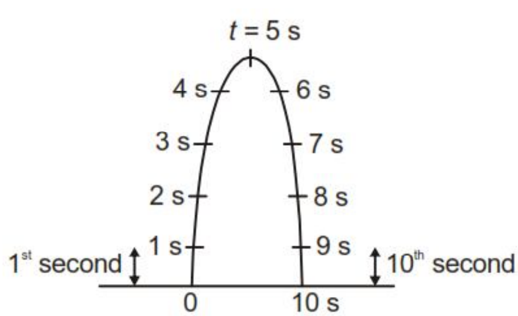
$$x = (-2t^3 + 3t^2 + 5)m \;\Rightarrow \frac{dx}{dt} = -6t^2 + 6t = v$$

$$\Rightarrow \frac{d^2x}{dt^2} = -12t + 6 \qquad (\text{for } v = 0, 6t = 6t^2 \Rightarrow t = 1s)$$

$$a|_{t=1s} = -12 + 6 = -6ms^{-2}$$

7. **(1)**

The motion under gravity is a symmetric motion and the time taken to go up is same as time taken to come back to the initial position.



So, clearly the distance travelled in 1st second is same as that travelled in 10th second.

8. **(2)**

$u = 0, a = 2\ ms^{-2}$

The velocity of object after one second

$v = u + at$ $\qquad s = \frac{1}{2} \times 2 \times 1^2 = 1m$

$\Rightarrow \boxed{v = 2ms^{-1}}$

Now after separating from the balloon it will move under the effect of gravity alone

$-h = vt - \frac{1}{2} \times 9.8 \times t^2$

$\Rightarrow -1 = 2t - 4.9t^2$

$\Rightarrow 4.9t^2 - 2t - 1 = 0$

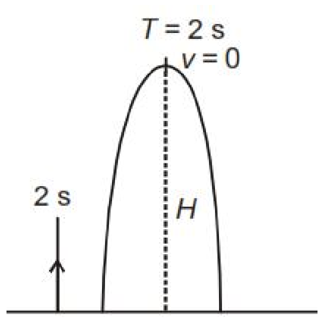
$\Rightarrow \boxed{t = 0.7s}$

9. **(3)**

$2T = \frac{2u}{g} \Rightarrow 2 = \frac{u}{9.8} \Rightarrow u = 19.6$

$H = \frac{u^2}{2g} = \frac{19.6 \times 19.6}{2 \times 9.8}$

$\Rightarrow \boxed{H = 19.6\ m}$

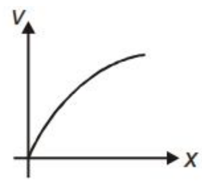


10. (3)

For uniform acceleration, $a \to$ constant

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

$\Rightarrow \boxed{v^2 \propto x}$ $(\because u = \text{rest})$

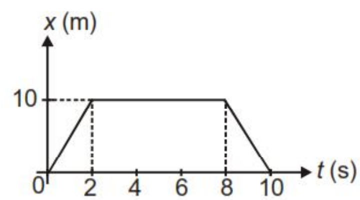


11. (3)

The total distance travelled from 0 to 2 s is 10 m

$2\text{ s to }8\text{ s} \to$ Zero distance

and from $10\text{ s} \to 10\text{ m}$



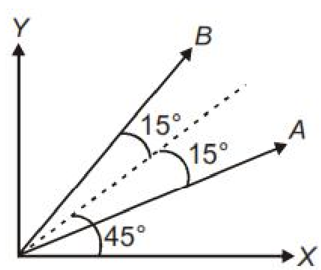
So, distacne = 10 + 0 + 10 = 20 m

12. (3)

As there are two extremes in the graph one is maxima and other is minima. At both maxima and minima the slope is zero. So, it comes to rest twice.

13. (4)

The slope of line A is tan 30º and B = tan 60º



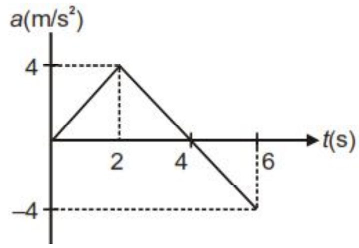
$$\frac{V_A}{V_B} = \frac{\tan 30^\circ}{\tan 60^\circ} = \frac{\frac{1}{\sqrt{3}}}{\sqrt{3}} = \frac{1}{3} \Rightarrow \boxed{V_A : V_B = 1:3}$$

14. (2)

Area under a-t graph gives change in velocity.

$$\Delta v = \frac{1}{2}\times 4\times 4 - \frac{1}{2}\times 2\times 4 = 8-4$$

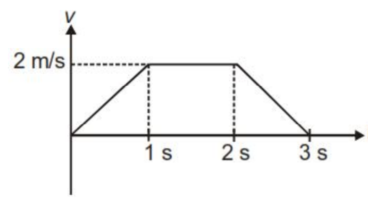
$$\boxed{\Delta v = 4\ ms^{-1}}$$



15. (1)

Draw the v-t graph from a-t graph.

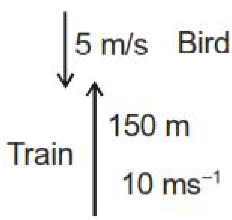
Area under v-t graph $= \frac{1}{2}\times 2\times (3+1) = 4m$



16. (1)

$$\text{Time} = \frac{150}{10+5} = \frac{150}{15}$$

$$\Rightarrow \boxed{T = 10\ s}$$



17. (3)

A measurement having more number of decimal places is the one with the most precision. So, 20.01 g is most precise.

18. (2)

Most accurate reading is the one having minimum error.

So, $6-6.281 = 0.28$ cm

$6.5-6.281 = 0.22$ cm

$5.99-6.281 = 0.29$ cm $\quad 6.0-6.281 = 0.28$ cm

So, second reading is most accurate.

19. (4)

A pure number has infinite number of significant figures.

20. (4)

$$V = IR \Rightarrow R = \frac{V}{I}$$

$$\Rightarrow \left(\frac{\Delta R}{r}\right) \times 100\% = \left(\frac{\Delta V}{V} + \frac{\Delta I}{I}\right) \times 100\%$$

$$\Rightarrow \frac{\Delta R}{R} \times 100\% = 3\% + 2\% = 5\%$$

21. (2)

The trailing zeros are not significant.

So, only two digits are significant.

22. (2)

The dimensions of change in velocity is same as that of velocity $[M^0LT^{-1}]$

23. (3)

Wavelength and focal length both are have units of length.

24. (1)

$$u = \frac{A\sqrt{x}}{x + B}$$

By the priciple of homogeneity, x = B (dimensionally)

$$\Rightarrow \boxed{B = [L]}$$

and $[ML^2T^{-2}] = \frac{AL^{1/2}}{L}$ $\quad [ML^2T^{-2}] = AL^{1/2}$

$$\boxed{A = [ML^{3/2}T^{-2}]}$$

25. (3)

Sped of light $c = \frac{1}{\sqrt{\mu_0 \varepsilon_0}} \Rightarrow c = (\mu_0 \varepsilon_0)^{-1/2}$

So dimensional formula of $(\mu_0 \varepsilon_0)^{-1/2}$

26. (3)

$$\left(P+\frac{a}{V^2}\right)=b\frac{\theta}{V}$$

Dimensionally

$$P=\frac{a}{V^2}$$

$$ML^{-1}T^{-2}\times L^6=a\Rightarrow \boxed{a=[ML^5T^{-2}]}$$

27. (3)

$$R=\frac{V}{I}=\frac{W/q}{I}=\frac{W}{I^2t} \qquad R=\frac{ML^2T^{-2}}{I^2T}\Rightarrow[ML^2T^{-3}I^{-2}]$$

$$\boxed{R=[ML^2T^{-3}I^{-2}]}$$

28. (2)

$$G=[E^a\ d^b\ P^c]$$

$$E=[ML^2T^{-2}]$$

$$d=[ML^{-3}]$$

$$P=[ML^2T^{-3}]$$

$$G=[M^{-1}L^3T^{-2}]$$

$$[M^{-1}L^3T^{-2}]=[ML^2T^{-2}]^a[ML^{-3}]^b[ML^2T^{-3}]^c$$

$$a+b+c=-1$$

$$2a-3b+2c=3$$

$$-2a-3c=-2\Rightarrow 2a+3c=2$$

On solving,

$$a=-2$$
$$b=-1$$
$$c=2$$

So $\boxed{G=[E^{-2}d^{-1}P^2]}$

29. (1)

$$KE = \frac{1}{2}MV^2$$

$$\Rightarrow \frac{\Delta K}{K}\times 100\% = \frac{\Delta M}{M}\times 100\% + \frac{2\Delta V}{V}\times 100\%$$

$$= 2\% + 2\times 3\%$$

$$\Rightarrow \boxed{\frac{\Delta K}{K}\times 100\% = 8\%}$$

30. (3)

Volume of sphere $= \frac{4}{3}\pi R^3$

$$\Rightarrow \frac{\Delta V}{V}\times 100\% = 3\times \frac{\Delta R}{R}\times 100\% = 3\times 2\%$$

$$\Rightarrow \boxed{\frac{\Delta V}{V}\times 100\% = 6\%}$$

31. (1)

$$\frac{L}{R} = \text{Time}$$

32. (2)

$$v = at + \frac{b}{t+c}$$

By the principle of homogeneeity

$$c = t = [T]$$

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

$$\frac{b}{T} = LT^{-1} \Rightarrow b = [L]$$

33. (1)

$$\vec{A} = 2\hat{i} + 4\hat{j} - 5\hat{k} \therefore |\vec{A}| = \sqrt{(2)^2 + (4)^2 + (-5)^2} = \sqrt{45}$$

$$\cos\alpha = \frac{2}{\sqrt{45}}, \quad \cos\beta = \frac{4}{\sqrt{45}}, \quad \cos\gamma = \frac{-5}{\sqrt{45}}$$

34. (2)

$$\vec{A} = \hat{i} + \hat{j} \Rightarrow |A| = \sqrt{1^2 + 1^2} = \sqrt{2}$$

$$\cos\alpha = \frac{A_x}{|A|} = \frac{1}{\sqrt{2}} = \cos 45^\circ \therefore \alpha = 45^\circ$$

35. (1)

$$\vec{P}_1 = mv\sin\theta\,\hat{i} - mv\cos\theta\,\hat{j}$$

and $\vec{P}_2 = mv\sin\theta\,\hat{i} + mv\cos\theta\,\hat{j}$

So change in momentum

$$\overline{\Delta P} = \vec{P}_2 - \vec{P}_1 = 2mv\cos\theta\,\hat{j}, |\Delta\vec{P}| = 2mv\cos\theta$$

36. (1)

37. (1)

Resultant $\vec{R} = \vec{P} + \vec{Q} + \vec{P} - \vec{Q} = 2\vec{P}$

The angle between $\vec{P}$ and $2\vec{P}$ is zero.

38. (3)

$$\hat{R} = \frac{\vec{R}}{|R|} = \frac{\hat{i} + \hat{j}}{\sqrt{1^2 + 1^2}} = \frac{1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{j}$$

39. (3)

40. (4)

Displacement, electrical and acceleration are vector quantities.

41. (3)

$$\vec{R} = \vec{A} + \vec{B} = 6\hat{i} + 7\hat{j} + 3\hat{i} + 4\hat{j} = 9\hat{i} + 11\hat{j}$$

$$\therefore |\vec{R}| = \sqrt{9^2 + 11^2} = \sqrt{81 + 121} = \sqrt{202}$$

42. (1)

$$\Delta v = 2v\sin\left(\frac{\theta}{2}\right) = 2 \times v \times \sin 90^\circ$$

43. (1)

$S = \vec{r}_2 - \vec{r}_1$

$W = \vec{F}.\vec{S} = (4\hat{i} + \hat{j} + 3\hat{k}).(11\hat{i} + 11\hat{j} + 15\hat{k})$

$= (4 \times 11 + 1 \times 11 + 3 \times 15) = 100\,J.$

44. (2)

$$\vec{A} \times \vec{B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & 1 & 2 \\ 2 & -2 & 4 \end{vmatrix}$$

$= (1 \times 4 - 2 \times -2)\hat{i} + (2 \times 2 - 4 \times 3)\hat{j} + (3 \times -2 - 1 \times 2)\hat{k}$

$= 8\hat{i} - 8\hat{j} - 8\hat{k}$

$\therefore$ Magnitude of $\vec{A} \times \vec{B} = |\vec{A} \times \vec{B}| = \sqrt{(8)^2 + (-8)^2 + (-8)^2}$

$= 8\sqrt{3}$

45. (1)

$\vec{\tau} = \vec{r} \times \vec{F} = (7\hat{i} + 3\hat{j} + \hat{k})(-3\hat{i} + \hat{j} + 5\hat{k})$

$$\vec{\tau} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 7 & 3 & 1 \\ -3 & 1 & 5 \end{vmatrix} = 14\hat{i} - 38\hat{j} + 16\hat{k}$$

CHEMISTRY

46. (1)

N – $1s^2\ 2s^2\ 2p_x^2\ 2p_y^1\ 2p_z$ – it violates Hund's rule of maximum spin multiplicity

47. (4)

$S = +\frac{1}{2}$ ⟵ ⇅ ⟶ $S = -\frac{1}{2}$

48. (2)

$$E_n = -13.6\frac{Z^2}{n^2}$$

$$= -13.6 \times \frac{Z^2}{1^2} \qquad = -54.4 \text{ ev.}$$

49. (4)

Fact

50. (2)

$$E = N_A h\nu$$

$= 6.022 \times 10^{23} \times 6.626 \times 10^{-34} \times 250$

$= 6.022 \times 6.626 \times 2.5 \times 10^{25} \times 10^{-34}$ J

$$\simeq 100 \times 10^{-9}\ \text{J}$$

$$\simeq 1 \times 10^{-7}\ \text{J}$$

$$\simeq 1\text{erg}$$

51. (4)

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

$$= \frac{6.63 \times 10^{-34}}{1.672 \times 10^{-27} \times 10^3} \qquad = \frac{6.63 \times 10^{-10}}{1.672}\text{m}$$

$= 3.965 \times 10^{-10}$ m

= 0.4 nm

52. (1)

$$\Delta V = 600 \times \frac{0.005}{100} = 0.030\,m/s \quad \Delta x m \Delta v = \frac{h}{4\pi}$$

$$\Delta x = \frac{h}{4\pi \times m\Delta v} \qquad = \frac{6.63 \times 10^{-34}}{4 \times 3.14 \times 9.1 \times 10^{-31} \times 0.03} = 1.93 \times 10^{-3} m$$

53. (4)

54. (1)

55. (4)

Higher (n + l) value – Higher will be energy.

When (n + l) is same then higher value of n higher will have higher.

56. (1)

$$\lambda = \frac{h}{mv} = \frac{6.63 \times 10^{-34}}{10 \times 10^{-16} \times 100} = 6.63 \times 10^{-31} m$$

57. (3)

n = 3

l = 2 (for 3d)

m = –2, –1, O, +1, +2

$K - 1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,4s^1$.

No 3d electron is potassium

58. (1)

59. (1)

60. (4)

Molar mass = 2 × V.D

= 2 × 30 = 60

E.F. mass = 30

$$n = \frac{M.F\ mass}{E.F.mass} = \frac{60}{30} = 60$$

M. F. = 2 × E.F.

= 2 × CH_2O = $C_2H_4O_2$ = CH_3COOH.

$$CH_3COOH + Na \longrightarrow CH_3COONa + \frac{1}{2}H_2$$

61. (3)

$$Na_2SO_4{\cdot}10H_2O \xrightarrow{\Delta} Na_2SO_4 + 10H_2O.$$

322gm $Na_2SO_4{\cdot}10H_2O$ lost 180 gm H_2O.

$\therefore$ 100 gm $\quad \frac{180}{322} \times 100\text{gm}\,H_2O.$

= 55.9 gm H_2O

62. (2)

I_2O_3

2 × 127 gm Iodine combine with 3 × 16 gm oxygen

$\therefore$ .42.3 gm Iodine $\quad \frac{3 \times 16}{2 \times 127} \times 42.3\text{gm oxygen}$

= 8 gm oxygen

63. (2)

Empirical and molecular formula mass has same percentage composition.

64. (3)

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$$

100 gm pure $CaCO_3$ gives 22.4 lit. CO_2

$\therefore$ 5gm pure $\quad \frac{22.4}{100} \times 5\text{ lit } CO_2$

65. (4)

66. (4)

67. (4)

Vol. of solution = $\frac{\text{mass of solution}}{\text{density}} = \frac{1120}{1.15}$

Molarity = $\frac{120 \times 1000}{60 \times 1120} \times 1.15 = 2.05\text{M}.$

68.	**(1)**	**69.**	**(1)**	**70.**	**(3)**	**71.**	**(2)**	**72.**	**(3)**	**73.**	**(3)**	**74.**	**(3)**
75.	**(1)**	**76.**	**(4)**	**77.**	**(3)**	**78.**	**(2)**	**79.**	**(2)**	**80.**	**(3)**	**81.**	**(3)**
82.	**(2)**	**83.**	**(4)**	**84.**	**(1)**	**85.**	**(3)**	**86.**	**(1)**	**87.**	**(1)**	**88.**	**(3)**
89.	**(4)**	**90.**	**(1)**										

BOTANY

91.	(3)	92.	(1)	93.	(4)	94.	(4)	95.	(1)	96.	(4)	97.	(1)
98.	(2)	99.	(3)	100.	(2)	101.	(4)	102.	(1)	103.	(2)	104.	(3)
105.	(1)	106.	(2)	107.	(2)	108.	(2)	109.	(4)	110.	(2)	111.	(4)
112.	(4)	113.	(4)	114.	(4)	115.	(2)	116.	(1)	117.	(2)	118.	(1)
119.	(1)	120.	(4)	121.	(4)	122.	(3)	123.	(4)	124.	(1)	125.	(4)
126.	(3)	127.	(3)	128.	(4)	129.	(1)	130.	(1)	131.	(1)	132.	(1)
133.	(2)	134.	(2)	135.	(4)								

ZOOLOGY

136.	(4)	137.	(2)	138.	(2)	139.	(1)	140.	(4)	141.	(4)	142.	(2)
143.	(1)	144.	(3)	145.	(4)	146.	(1)	147.	(1)	148.	(1)	149.	(1)
150.	(2)	151.	(4)	152.	(1)	153.	(2)	154.	(1)	155.	(1)	156.	(3)
157.	(2)	158.	(1)	159.	(1)	160.	(4)	161.	(4)	162.	(1)	163.	(2)
164.	(3)	165.	(4)	166.	(3)	167.	(2)	168.	(3)	169.	(1)	170.	(1)
171.	(1)	172.	(4)	173.	(1)	174.	(1)	175.	(2)	176.	(3)	177.	(4)
178.	(4)	179.	(3)	180.	(2)								