



# AVIRAL CLASSES

## IIT-JEE | NEET | FOUNDATIONS

### ULTIMATE TEST SERIES NEET -2020

### XII TEST-2 SOLUTION

Test Date :19-03-2020

#### [PHYSICS]

1.  $f = \mu \times 250 = 0.3 \times 250 = 75 \text{ N}$

2.  $R = 4H$

$$\frac{U^2 \times 2 \sin \theta \cos \theta}{g} = 4 \times \frac{U^2 \sin^2 \theta}{2g}$$

$\tan \theta = 1 \quad \boxed{\theta = 45^\circ}$

3. For equilibrium :-  $f \geq mg$

$$\mu Kd \geq mg \quad K \geq \frac{mg}{\mu d}$$

Hence  $K_{\min} = \frac{mg}{\mu d}$

4.  $a = \sqrt{a_c^2 + a_t^2} = \sqrt{\left(\frac{V^2}{r}\right)^2 + a_t^2}$

$$a = \sqrt{\left(\frac{900}{450}\right)^2 + (2)^2} = 2.8 \text{ m/s}^2$$

5.  $\vec{F}_A + \vec{F}_B + \vec{F}_C + \vec{F}_D + \vec{F}_E = (100 \times 3) \hat{i} = 300 \hat{i}$   
----- (1)

$$\vec{F}_B + \vec{F}_C + \vec{F}_D + \vec{F}_E = (100 \times 1)(-\hat{i}) = -100 \hat{i}$$
  
----- (2)

$$\vec{F}_A + \vec{F}_C + \vec{F}_D + \vec{F}_E = (100 \times 24) \hat{j} = 2400 \hat{j}$$
  
----- (3)

From (1) & (2)  $\Rightarrow \vec{F}_A = 400 \hat{i}$

From (1) & (3)  $\Rightarrow \vec{F}_B = 300 \hat{i} - 2400 \hat{j}$

So, when A & B pulling the cart then acceleration

$$\vec{a} = \frac{\vec{F}_A + \vec{F}_B}{m} = \frac{700 \hat{i} - 2400 \hat{j}}{100} = (7 \hat{i} - 24 \hat{j}) \text{ m/s}^2$$

$|\vec{a}| = 25 \text{ m/s}^2$

6. D

7.  $\frac{mV^2}{r} = mg \quad V = \sqrt{rg} = \sqrt{1.6 \times 10}$

$V = 4 \text{ m/s}$

8.  $v \cos 45^\circ = 150 \cos 60^\circ \Rightarrow v = 75 \sqrt{2} \text{ m/s}$   
 $v_y = u_y + a_y t \Rightarrow v \sin 45^\circ = 150 \sin 60^\circ - g \times t$   
 $t = \frac{150 \sin 60^\circ - v \sin 45^\circ}{10} = 7.5(\sqrt{3} - 1) \text{ sec}$

9.  $v = u + at \Rightarrow 1000 = 0 + a \times 10$   
 $a = 100 \text{ m/s}^2$

$$m = \frac{F}{a} = \frac{10^5}{100} = 10^3 \text{ kg}$$

10.  $m_1 g = \mu m_2 g \quad m_1 \rightarrow \text{mass of hanged part}$   
 $m_2 \rightarrow \text{mass of remaining part}$

$$\mu = \frac{m_1}{m_2} = \frac{\frac{M}{L} \times \ell}{\frac{M}{L}(L - \ell)} = \frac{\ell}{L - \ell}$$

11.  $T = W' = m(g - a)$   
 $T = 1500(9.8 - 1.8)$   
 $T = 1500 \times 8 = 12000 \text{ N}$

12.  $W = \Delta K \Rightarrow 0 = \int_0^S (mg \sin \theta - \mu mg \cos \theta) dx$   
 $(mg \sin \theta)S = (mg \cos \theta) \frac{KS^2}{2}$

$$S = \frac{2 \tan \theta}{K}$$

13. For looping the loop minimum velocity at top

point  $v = \sqrt{gL}$

time taken by particle

$$t = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2 \times 2L}{g}} = 2\sqrt{\frac{L}{g}}$$

$\therefore$  horizontal range  $x = vt = \sqrt{gL} \times 2\sqrt{\frac{L}{g}} = 2L$

14. Force on bullets =  $\frac{\Delta P}{\Delta t} = \frac{N(-mv - mv)}{t}$

= - 2 nmv

by Newton's third law

force on wall = - force on bullets

= 2 nmv

15. D

16.  $u \cos \theta = 1$

$u \sin \theta = 2$

$\Rightarrow \tan \theta = 2, u = \sqrt{5}$

equation of trajectory  $y = x \tan \theta - \frac{1}{2}g \left( \frac{x}{u \cos \theta} \right)^2$

$y = x \times 2 - \frac{1}{2} \times 10 \times \left( \frac{x}{1} \right)^2$

$y = 2x - 5x^2$

17.  $W = f = \mu N$

$W = 0.2 \times 10 = 2N$

18.  $\frac{H_1}{H_2} = \tan^2 \theta$

$H_2 - H_1 = 50$

$H_2 (1 - \tan^2 \theta) = 50$

$\Rightarrow \frac{u^2 \cos^2 \theta}{2g} \times \left( \frac{\cos^2 \theta - \sin^2 \theta}{\cos^2 \theta} \right) = 50$

$\Rightarrow 1 - 2\sin^2 \theta = \frac{5}{8}$

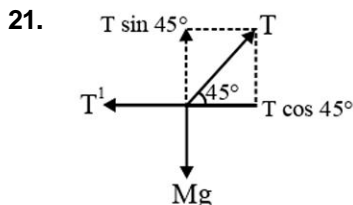
$\Rightarrow \sin^2 \theta = \frac{3}{16}$

so  $H_1 = \frac{u^2 \sin^2 \theta}{2g} = \frac{(40)^2}{2 \times 10} \times \frac{3}{16} = 15 \text{ m}$

so  $H_2 = 65 \text{ m}$ .

19.  $\alpha = \frac{\omega_2 - \omega_1}{t}$  and  $a_T = \alpha r$

20. D



$T \sin 45^\circ = Mg \dots\dots(1)$

$T \cos 45^\circ = T^1 \dots\dots(2)$

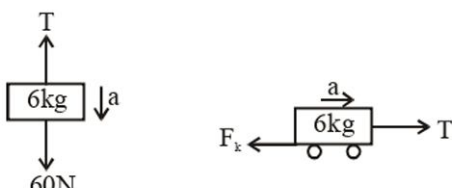
From (1) & (2)

$\therefore \tan 45^\circ = \frac{Mg}{T^1} \quad \therefore T^1 = Mg = 100 \text{ g}$

22. A

23. C

24. D

25. 

$$60 - T = 6a \quad \dots\dots(i)$$

$$T = f_K = 30a$$

$$T - 30 \times 0.1 \times 10 = 30a$$

$$T - 30 = 5(6a)$$

$$T - 30 = 5(60 - T) \quad (\text{by eq. i})$$

$$T - 30 = 300 - 5T$$

$$6T = 330$$

$$T = 55 \text{ N}$$

26. Impulse =  $\Delta p = m(v_f - v_i)$

$$= 0.5 \left[ -\frac{10}{5} - \frac{10}{5} \right]$$

27.  $KE_f = \frac{1}{4} KE_i$

$$\frac{1}{2} mV^2 = \frac{1}{4} \left( \frac{1}{2} mV_0^2 \right)$$

$$V = \frac{V_0}{2}$$

$$V = u + at \quad (a = \mu g)$$

$$\frac{V_0}{2} = V_0 - \mu g t_0$$

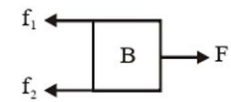
$$\mu g t_0 = \frac{V_0}{2}$$

$$\mu = \frac{V_0}{2gt_0}$$

28.  $H_1 H_2 = \frac{u^2 \sin^2 \theta}{2g} \times \frac{u^2 \cos^2 \theta}{2g} = \left( \frac{u^2 2 \sin \theta \cos \theta}{g} \right)^2 \times \frac{1}{16} = \frac{R^2}{16}$

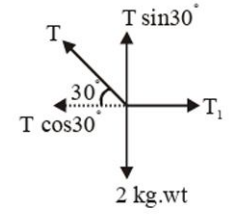
$$\therefore R^2 = 16H_1 H_2 \Rightarrow R = 4\sqrt{H_1 H_2}$$

29.  $F = f_1 + f_2$



$$= 0.2 \times 100 \times g + 0.3(100+200)g$$

$$= 1100 \text{ N}$$

30. 

$$T \sin 30^\circ = 2 \quad \dots\dots(1)$$

$$T \cos 30^\circ = T_1 \quad \dots\dots(2)$$

$$(1) \div (2)$$

$$\tan 30^\circ = \frac{2}{T_1}$$

$$T_1 = 2\sqrt{2} \text{ kg-wt.}$$

31. D

32.  $V_{\max} = 0 + \theta T$

$\therefore$  acc<sup>n</sup>. & deceleration are const.

$$\therefore V_{\text{avg}} = \frac{0 + V_{\max}}{2} = \frac{aT}{2}$$

33.  $\frac{T_{\text{up}}}{T_{\text{down}}} = \frac{m(g+a)}{m(g-a)} = \frac{9.8+4.9}{9.8-4.9} = \frac{3}{1}$

34.  $\text{time} = \frac{\text{Separation covered}}{\text{relative speed}}$

$$= \frac{100}{10-9} = 100 \text{ sec.}$$

35. C

36.  $3m(200 \cos 60^\circ) \hat{i} = (m \times 100) \hat{j} + (m \times 100) (-\hat{j}) + m\vec{v}$

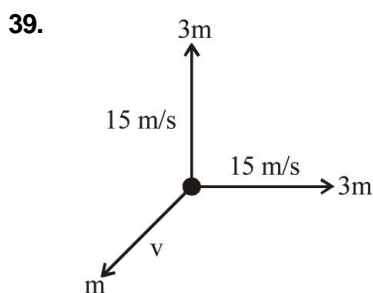
$$\vec{v} = (300 \hat{i}) \text{ m/s}$$

300 m/s in the horizontal direction.

37. For 20 Kg block :-  
 $100 - \mu \times 20 \times g = 20a$

38.  $y = 16x \left( 1 - \frac{5x}{64} \right)$

so,  $R = \frac{64}{5} = 12.8\text{m}$

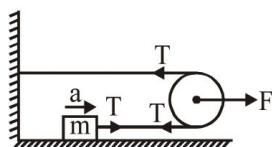


$$mv = \sqrt{(3m \times 15)^2 + (3m \times 15)^2}$$

$$mv = 45m\sqrt{2}$$

$$v = 45\sqrt{2} \text{ m/s}$$

40.



Block :  $T = ma$

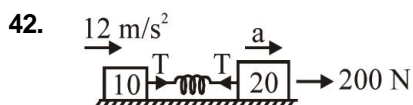
$$F = 2T \Rightarrow T = F/2$$

$$a = \frac{F}{2m}$$

If the block moves by a distance d, pulley moves by  $d/2$

$$a_p = \frac{a}{2} = \frac{F}{4m}$$

41.  $T_p = M_{\text{below}} \times (g + a) = (3 + 5)(10 + 10) = 160\text{N}$



$$T = 10 \times 12 = 120$$

$$200 - T = 20a \Rightarrow a = 4 \text{ m/s}^2$$

43. A

44. B

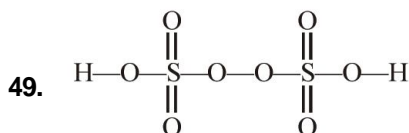
45. 
$$a = \frac{(M_{\text{big}} - M_{\text{small}})g}{M_{\text{big}} + M_{\text{small}}}$$

## [CHEMISTRY]

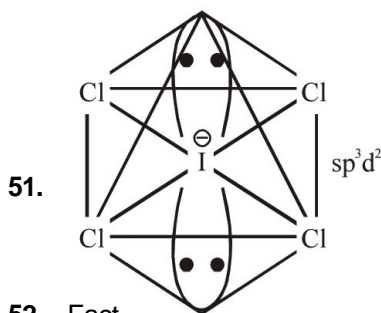
46. B

47. B

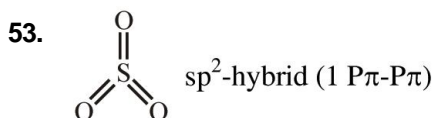
48. B



50.  $\text{O}_2(n=2), \text{B}_2(n=2), \text{O}_2^-(n=1)$   
 $[n = \text{unpaired } e^- \text{ number} \propto \text{paramagnetic nature}]$



52. Fact



54. Valency remains constant in a group.

55.  $\text{OF}_2 < \text{H}_2\text{O} < \text{NH}_3 < \text{Cl}_2\text{O}$

56. Fact

57.  $\pi * 2p_x^1 = \pi * 2p_y^1$

58. Fact

59. The conditions required for the formation of an ionic bond.

(i) Ionization enthalpy  $[\text{M}(\text{g}) \rightarrow \text{M}^+(\text{g}) + e^-]$  of electropositive element must be low.

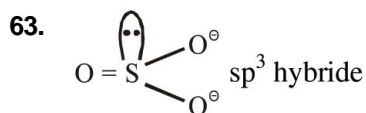
(ii) Negative value of electron gain enthalpy  $[\text{X}(\text{g}) + e^- \rightarrow \text{X}^-(\text{g})]$  of electronegative element should be high.

60. Fact

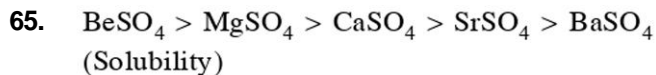
61.  $\text{N}_2^+$  (Number of unpaired  $e^- \Rightarrow \sigma 2p_z^1$ )

$= 1 = \text{Paramagnetic}$

62. IP order  $\text{F}^- < \text{Cl}^-$



64. A

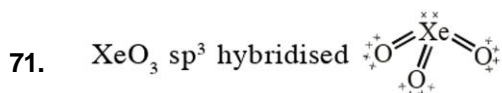
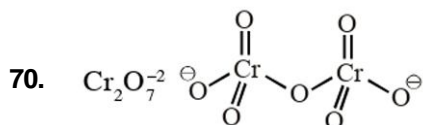


$$\sqrt{\frac{3RT_{SO_2}}{64}} = \sqrt{\frac{3R \times 303}{32}}$$

67. [Metallic charater  $\propto$  size]  
NCERT XI Para-II Pg. # 292

68. B

69. A



72. D

73. D

74. C

75. D

76. Intermolecular attraction  $\propto a$

77. D

78. C

79. C

80. B

81. D

82. C

83. D

84. B

85. A

86.  $\frac{r_B}{r_A} = \sqrt{\frac{M_A}{M_B}} = \frac{V_B/t_B}{V_A/t_A} \Rightarrow \sqrt{\frac{49}{M_B}} = \frac{20}{10}$   
 $M_B = 12.25 \text{ u}$

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

88. 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

89. A

90. Bond angle  $\propto \frac{1}{\text{Number of lp}}$