JEE EXPERT

ANSWER KEY

JEE Advanced

MODULE TEST (MT - 01)

Batch : 11TH (Zenith - A01 & A02)

Date 25.08.2019

PHYSICS

1	**(C)**	**2**	**(D)**	**3**	**(A)**	**4**	**(B)**	**5**	**(C)**
6	**(B)**	**7**	**(C)**	**8**	**(D)**				
9	**(ABC)**	**10**	**(ABD)**	**11**	**(ABCD)**	**12**	**(BC)**		
13	**(0300)**	**14**	**(0004)**	**15**	**(0004)**	**16**	**(0003)**		
17	**(0002)**	**18**	**(0022)**						

CHEMISTRY

19	**(B)**	**20**	**(A&C)**	**21**	**(GRACE)**	**22**	**(C)**	**23**	**(C)**
24	**(A)**	**25**	**(A)**	**26**	**(GRACE)**				
27	**(BCD)**	**28**	**(ABD)**	**29**	**(BC)**	**30**	**(A)**		
31	**(0006)**	**32**	**(0006)**	**33**	**(50)**	**34**	**(0001)**		
35	**(0007)**	**36**	**(0005)**						

MATHEMATICS

37	**(C)**	**38**	**(C)**	**39**	**(D)**	**40**	**(A)**	**41**	**(A)**
42	**(D)**	**43**	**(B)**	**44**	**(C)**				
45	**(AC)**	**46**	**(BC)**	**47**	**(AC)**	**48**	**(BD)**		
49	**(0005)**	**50**	**(0007)**	**51**	**(0001)**	**52**	**(0011)**		
53	**(1601)**	**54**	**(0050)**						

JEE EXPERT

SOLUTIONS

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PART - I : PHYSICS

1. **Sol. (C)**

2. Sol. (D)

3. **Sol. (A)**

4. **Sol. (B)**

$a_{max} = \mu_s g = 0.2 \times 10 = 2 m/s^2$

$t_{min} = \frac{u}{a_{max}} = \frac{4}{2} = 2sec$]

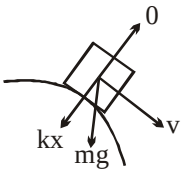
5. **Sol. (C)** It must be constant]

6. **Sol. (B)**

$WD = \Delta k$ $\theta = 60°$

$mgR(1-\cos\theta) = \frac{1}{2} mv^2 - 0 - (1)$

$\therefore v = \sqrt{gR}$



$mg\cos\theta + kx = \frac{mv^2}{R}$

$x = \frac{mg}{2k} = \frac{1}{2} m$ $\therefore$ Natural length $= R - x = 1.5\ m$

7. **Sol.: (C)**

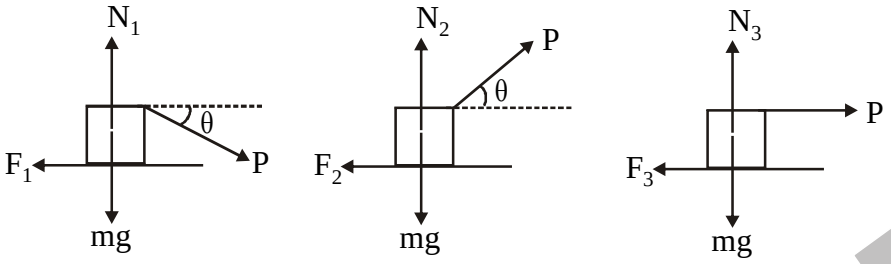
$$h_1 = \frac{u^2}{2g},\ h_2 = \frac{(u\sin 30°)^2}{2g} = \frac{u^2}{8g}$$

$$h_1 : h_2 = 4 : 1$$

8. **Sol.: (D)**

$$w = \int_0^5 F.dx = \int_0^5 \left(7 - 2x + 3x^2\right)dx = 135\ \text{J}$$

9. Sol. **(A, B, C)**



$N_1 = P\sin\theta + mg$ $\quad$ $N_2 = mg - P\cos\theta$ $\quad$ $N_3 = mg$

$F_1 = P\cos\theta$ $\quad$ $F_2 = P\cos\theta$ $\quad$ $F_3 = P$: rest

$F_1 = \mu N_1$ $\quad$ $F_2 = \mu N_2$ $\quad$ $F_3 = \mu N_3$: motion]

10. Sol. **(A, B, D)**

11. Sol. **(A, B, C, D)**

12. Sol. **(B, C)**

(A) $\quad -\frac{1}{2}k(x^2 - x_0^2) = \frac{1}{2}mv^2 - 0$

$$\therefore \quad v = \sqrt{\frac{k}{m}(x_0^2 - x^2)}$$

$$\therefore \quad P = F.v = kx\ \sqrt{\frac{k}{m}(x_0^2 - x^2)}$$

(B) $\quad P = k\ \sqrt{\frac{k}{m}(x_0^2\, x^2 - x^4)}$

(C) $\quad y = x_0^2\, x^2 - x^4$

$$\frac{dy}{dx} = 0 \qquad \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

$$\therefore \quad P_{max} \text{ is at } x = \frac{x_0}{\sqrt{2}} \qquad]$$

13. Sol. **[Ans. 0300]**

$r = 20\sqrt{3}$

$\tan\theta = 60°$ (θ is angle made by string with vertical)

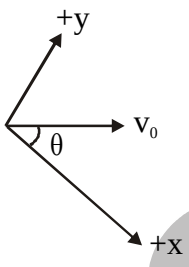
$Fy_{net} = 3F\cos 60° = 3 \times 200 \times \frac{1}{2}$

$Fy_{net} = 300$ N (Fy_{net} is force along vertical direction)

14. **Sol. [Ans. 0004]**

B	C	BC
$v_x = v_0\cos\theta$	$v_x = v$	$v_0\cos\theta - v$
$v_y = v_0\sin\theta$	$v_y = 0$	$v_0\sin\theta$
$a_x = g\sin\theta$	$a_x = g\sin\theta$	0
$a_y = -g\cos\theta$	$a_y = 0$	$-g\cos\theta$
		$a_y = 0$

$0 = v_0\sin\theta\, t - \frac{1}{2} g\cos\theta\, t^2$



$\therefore \quad t = \frac{3}{2}$ s

$x = (v_0\cos\theta - v)t$

$\therefore \quad v = 4$ m/s

15. **Sol. [Ans 0004]**

$$a = \frac{20g\sin 37° - 0.5\times 10g\cos 37° - 0.4g\cos 37°}{20}$$

for m_1

$T + 10g\sin 37° - 0.5 \times 10g\cos 37° = 10a$

16. **Sol. [Ans. 0003]**

Time taken $T = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2\times 20}{10}}$

$T = 2$ sec

$S = 30 \times 2 = 60$ cm

Hence 3 poles away.

17. **Sol. [Ans. 0002]**

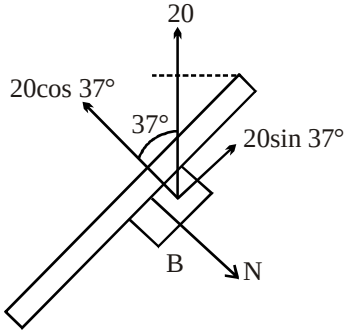
$N = 20\cos 37°$

$N = 20 \times \frac{4}{5} = 16$

$f_{s\,max} = 9.6$

$f_k = 8$

$20\sin 37° - f_k = 2a$



$20 \times \frac{3}{5} - 8 = 2a$

$a = 2\ m/s^2$

18. **Sol. [Ans. 0022]**

Motion will start when $F \geq \mu_s mg$ at $t = 1s$

after that $F - \mu_k mg = ma$

$3t^2 - 2 = a$ or $3t^2 - 2 = \frac{dV}{dt} \Rightarrow V = \int_1^3 (3t^2 - 2)dt = 22\ m/s$

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