SOLUTIONS

PHASE TEST-2

GZR-1901-1907, GZRK-1901-1902

GZBS-1901

JEE ADVANCED PATTERN

Test Date: 19-11-2017

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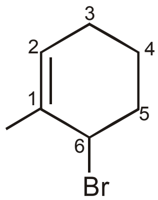
CHEMISTRY

1. **(B)**



2. **(C)**

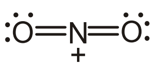
$\underset{\substack{x+4=+1 \\ x=-3}}{NH_4^+}\ \underset{\substack{x-6=-1 \\ x=+5}}{NO_3^-}$

3. **(D)**

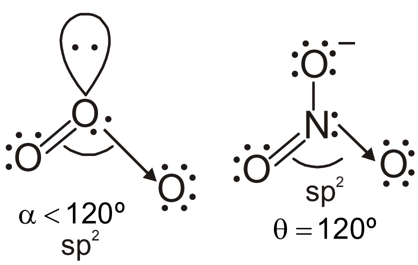
$2x + 3y = 2$

$x + y = 0.96$

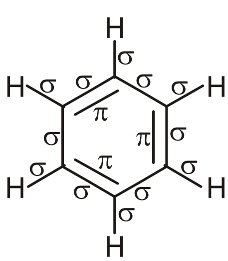
4. **(C)**



$\theta = 180^o$



5. **(C)**



Total $\pi-\text{bond}$ = 3

Total $\sigma-\text{bond}$ = 12

So, ratio of π bond and σ bond is : $\frac{3}{12} = \frac{1}{4} = 1:4$

6. **(D)**

[d] $\rightarrow$ incorrect

Ge

$\left.\begin{matrix} Sn \\ Pb \end{matrix}\right\}$ (Exception) Lanthanide Contraction

$I.E_1$ = Ge > Pb > Sn

7. **(1)**

2 + 2 (2 × 1 + x – 4) = 0

x = +1

8. **(1)**

9. **(2)**

r_1 of H-atom = 0.529 Å r_n

(n like atom) $= \frac{n^2}{Z} \times r_1$ (H-atom)

r_n of $Be^{3+} \Rightarrow \frac{n^2}{Z} \times r_1$ (H-atom)

$= 0.529\,\text{Å}(Z = 4 \text{ for } Be^{3+})$

$\Rightarrow \frac{n^2}{Z} \times 0.529 = 0.529 = n^2 = Z$

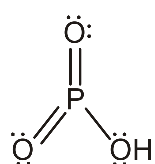
$\Rightarrow n^2 = 4 = n = 2$

10. **(3)**

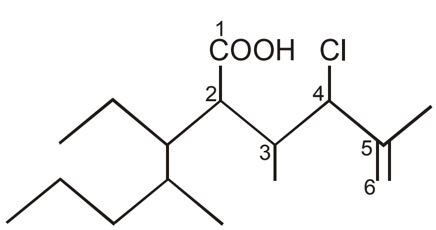
ℓ.p = 6 = x

π bonds $= 2 = Y$

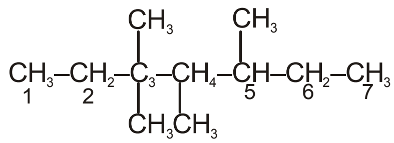
$\therefore \frac{X}{Y} = 3$



11. **(6)**

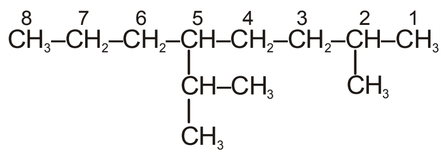


12. (A)

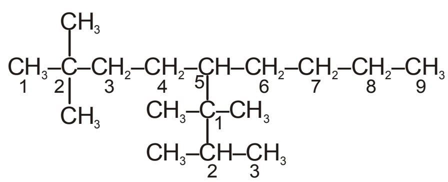


lowest set of 3,3,4,5 lo cant–

13. (D)



14. (C)



15. (A)

$$h_L d_L = h_{Hg} d_{Hg}$$

$$h_L = \frac{76 \times 13.6}{5.44} = 190\,\text{cm}$$

16. (D)

$$P_{Gas} = P_{Atm} + P_L = 1 + \frac{38}{190} = 1.2$$

17. (B)

$$3A(g) \rightleftharpoons A_3(g)$$

$$t = 0 \quad 1.2\,\text{atm} \qquad A_3(g)$$

$$t = t_{eq.} \quad 1.2 - 0.36 \qquad \frac{1}{3}(0.36) = 0.12\,\text{atm}$$

$\therefore$ P_T = 1.2 – 0.36 + 0.12 = 0.96 atm

$\therefore$ Pressure difference in column

= 1 – 0.96 = 0.04 atm

$\therefore$ The difference in height of the liquid level in two columns = 0.04 × 190 = 7.6 cm

18. (A - q); (B - p); (C - r); (D - t)

19. (A - r) ; (B - s) ; (C - q) ; (D - p)

MATHEMATICS

20. (D)

$y^2 + 8x - 2y - 15 = 0$

$\Rightarrow (y-1)^2 = -8(x-2)$

Shortest focal chord is the latus rectum of the parabola whose length is 8.

21. (A)

$$x = \frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + ...\text{to } \infty$$

$$= \left(\frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + ...\text{to } \infty\right) - \left(\frac{1}{2^4} + \frac{1}{4^4} + ...\text{to } \infty\right)$$

$$= \frac{\pi^4}{90} - \frac{1}{16}\left(\frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + ...\text{to } \infty\right) = \frac{\pi^4}{90} - \frac{1}{16}.\frac{\pi^4}{90}$$

22. (A)

Clearly the other extremity of latus rectum is (2, – 2). It's axis is x-axis. Corresponding value of

$a = \frac{2-0}{2} = 1$. Hence it's vertex is (1, 0) or (3, 0). Thus it's equation is $y^2 = 4(x-1)$

or $y^2 = -4(x-3)$.

23. (D)

$\tan(180° - \theta) = \text{slope of } AB = -3$

$\therefore \quad \tan\theta = 3$

$\therefore \quad \frac{OC}{AC} = \tan\theta, \frac{OC}{BC} = \cot\theta$

$\Rightarrow \quad \frac{BC}{AC} = \frac{\tan\theta}{\cot\theta} = \tan^2\theta = 9$

24. (C)

The two circles are

$x^2 + y^2 - 4x - 6y - 3 = 0$ and $x^2 + y^2 + 2x + 2y + 1 = 0$

Centre : $C_1 \equiv (2, 3)$, $C_2 \equiv (-1, -1)$ radii : $r_1 = 4$, $r_2 = 1$

We have $C_1C_2 = 5 = r_1 + r_2$, therefore there are 3 common tangents to the given circles.

25. (C)

All the letters are different : ${}^{10}C_4 \cdot 4!$

3 same, 1 different : ${}^{9}C_1 \cdot \frac{4!}{3!}$

2 same, 2 different : ${}^{3}C_1 \cdot {}^{9}C_2 \cdot \frac{4!}{2!}$

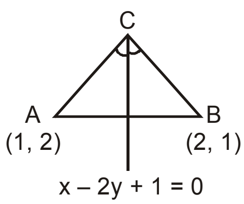
2 same, 2 same : ${}^{3}C_2 \cdot \frac{4!}{2!2!}$

Total number of words = 6390.

26. (4)

27. (2)

Image of A say A' w.r.t x – 2y + 1 = 0 lies on BC



Here, $\frac{x-1}{1} = \frac{y-2}{-2} = -2\frac{(1-4+1)}{1+2^2} = \frac{4}{5} \Rightarrow A' = \left(\frac{9}{5}, \frac{2}{5}\right)$

$\therefore$ Equation of BC joining $A' = \left(\frac{9}{5}, \frac{2}{5}\right)$ and B (2, 1) is

$$y - 1 = \frac{1-\frac{2}{5}}{2-\frac{9}{5}}(x-2) = \frac{3}{1}(x-2)$$

$3x - y - 5 = 0 \Rightarrow a + b = 3 - 1 = 2$

28. (6)

Distance between lines $3x - 4y + 4 = 0$ and $6x - 8y - 7 = 0$ (Which are parallel) is equal to diameter of the circle.

$$\therefore D = \frac{4+\frac{7}{2}}{\sqrt{3^2+4^2}} = \frac{3}{2}$$

$$\therefore 4D = \frac{3}{2} \times 4 = 6$$

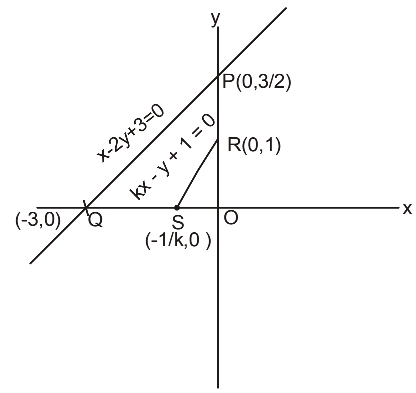
29. (2)

Points P,Q, S and R will be concyclic

$\therefore OP \times OR = OQ \times OS$

$\Rightarrow \frac{3}{2} \times 1 = 3 \times \frac{1}{k}$

$\therefore \quad k = 2$

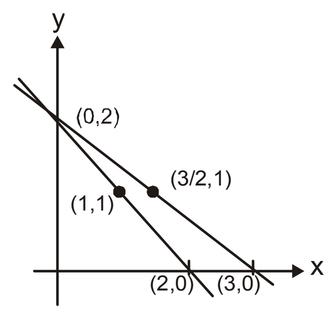


30. (1)

Therefore, equation of straight line

$\Rightarrow \frac{y-1}{x-1} = \frac{1-1}{\frac{3}{2}-1}$

$\Rightarrow y = 1$



31. (B)

32. (A)

33. (B)

34. (C)

35. (B)

36. (D)

37. (A $\rightarrow$p, B$\rightarrow$q, C $\rightarrow$s, D $\rightarrow$ r)

(P) $AH \perp BC$

ok $\left(\frac{k}{h}\right)\left(\frac{3+1}{-2-5}\right) = -1$

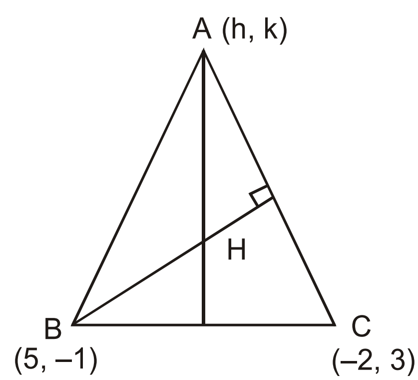
$\therefore 4k = 7h$ (i)

$BH \perp AC$

or $\left(\frac{0+1}{0-5}\right)\left(\frac{k-3}{h+2}\right) = -1$

$\therefore k - 3 = 5(h+2)$ (ii)

or 7h – 12 = 20h + 40



or 13h = –52

or h = –4

$\therefore k = -7$

Hence, point A is (–4, -7)

(Q) x + y – = 0

4x + 3y – 10 = 0

Let (h, 4 – h) be the point on (i). Then,

$$\left|\frac{4h + 3(4-h) - 10}{5}\right| = 1$$

or $h + 2 = \pm 5$

or h =3, h = –7

Hence, the required point is either (3, 1) or (–7, 11)

(R) Since lines x + y – 1 = 0 and x – y + 3 = 0 are perpendicular, the orthocenter of the triangle is the point of intersection of these lines, i.e., (–1, 2)

(S) Since 2a, b, c are in AP, we have

$$b = \frac{2a + c}{2} \text{ or } 2a - 2b + c = 0$$

Comparing with the line ax + by + c = 0, we have x = 2 and y = –2. Hence, the lines are concurrent at (2, –2)

38. (A $\rightarrow$(p,q); B $\rightarrow$ (p,s); C $\rightarrow$ s , D $\rightarrow$q, r, s,t)

Passing though origin : c = 0

Touches x - axis : $g^2 = c$

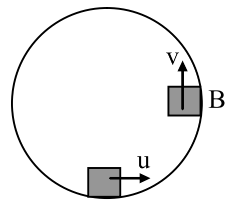
Touches y - axis : $f^2 = c$

Centre at y = x : g = f

PHYSICS

39. [A]

$u^2 = 5gR$



$\therefore v^2 = u^2 - 2gR$

$= 5gR - 2gR = 3gR$

Tangential acceleration at B is

$a_t = g$ (downwards)

Centripetal acceleration at B is

$a_C = \dfrac{v^2}{R} = 3g$

$\therefore$ Total acceleration will be

$a = \sqrt{a_C^2 + a_t^2} = g\sqrt{10}$

40. [C]

41. [B]

As $W = \Delta K$

Force is along negative x-axis and displacement is along + x-axis

$\therefore$ W = negative

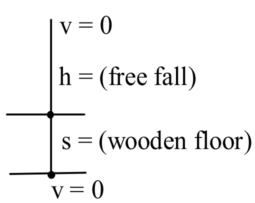
Hence

ΔK = negative

42. [B]

Work done depends upon frame of reference.

43. [B]



$W_{net} = \Delta k$

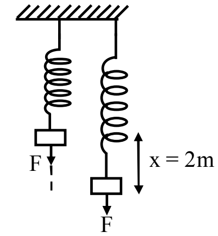
$W_{gravity} + W_{resistance} = 0$

$mg(h + s) - F_S = 0$

$F = mg\left(\dfrac{h}{s} + 1\right)$

44. [D]

45. (2)



At equilibrium , $mg = kx_0 \Rightarrow x_0 = \frac{mg}{k} = 1m$

$\therefore W_{ext} = U_2 - U_1$

$= \frac{1}{2}kx_2^2 - [\frac{1}{2}kx_1^2 + mgh]$

$= \frac{1}{2}k(x_2^2 - x_1^2) - mgh$

$= \frac{1}{2} \times 100 \times (3^2 - 1^2) - 10 \times 10 \times 2 = 200$ J

46. [0]

$W_{net} = \Delta K$

$\Rightarrow (F \sin\theta . \ell - mg\ell(1 - \cos\theta) = \frac{1}{2}mv^2$

where $\theta = 37^o$, $F = \frac{mg}{3}$

$\Rightarrow v = \left\{\frac{2\ell}{5m}(3F - mg)\right\}^{\frac{1}{2}} = 0$

47. [5]

$10 - v\cos 60^o = 0$

$\therefore H = \frac{v^2 \sin^2 60^o}{2g} = 15$ m

48. (3)

For equilibrium,

$10 = 8 + T$ …(i)

$T + f_2 = 20$ …(ii)

$\Rightarrow f_2 = 18N$

49. (4)

$F \propto v^a$

$\propto \rho^b$

$\propto A^c$

$\Rightarrow F = k\, v^a\, \rho^b\, A^c$ k : dimensional constant.

By dimension analysis a = 2 $\Rightarrow F \propto v^2$.

50. **[A]** **51.** **[B]** **52.** **[A]** **53.** **[B]**

54. **[D]** **55.** **[B]**

56. **(A) → (q), (B) → (p), (C) → (r), (D) → (s)**

$F = -\frac{dU}{dx} = -[2\,ax - b] = b - 2\,ax$

So (A) → (Q)

At equilibrium position

F = 0

$\therefore$ x = b/2a

SO (B) → (P)

Equilibrium potential energy

$U = \frac{a.b^2}{4a^2} - \frac{b.b}{2a} = \frac{-b^2}{4a}$

So (C) → (R)

$\frac{d^2U}{dx^2} = 2a$ hence $\frac{d^2U}{dx^2} = +ve$

i.e. system is at stable equilibrium.

So (D) → (S)

57. **(A) → q ; (B) → r ; (C) → p ; (D) → s**