SOLUTIONS

PHASE TEST-2

GZRA-1901, GZR-1901(A)

GZRS-1901

JEE ADVANCED PATTERN

Test Date: 18-11-2017

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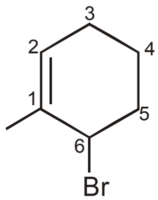
CHEMISTRY

1. (B)



2. (C)

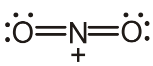
$\underset{\substack{x+4=+1 \\ x=-3}}{NH_4^+}$ $\underset{\substack{x-6=-1 \\ x=+5}}{NO_3^-}$

3. (D)

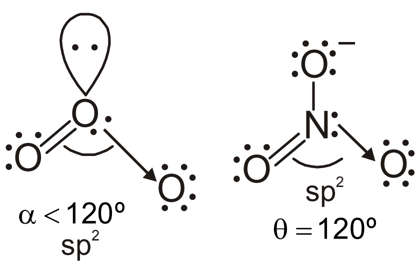
$2x + 3y = 2$

$x + y = 0.96$

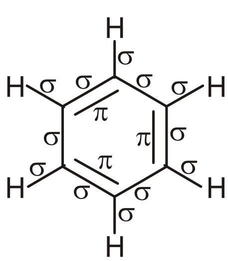
4. (C)



$\theta = 180^o$



5. (C)



Total $\pi -$ bond $= 3$

Total $\sigma -$ 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) $= \dfrac{n^2}{Z} \times r_1$ (H-atom)

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

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

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

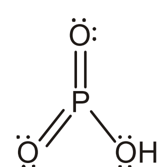
$\Rightarrow n^2 = 4 = n = 2$

10. (3)

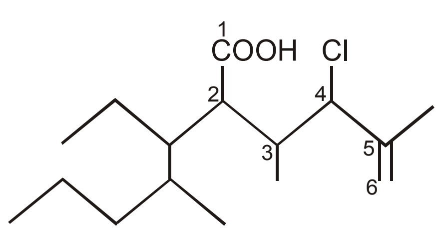
ℓ.p = 6 = x

π bonds $= 2 = Y$

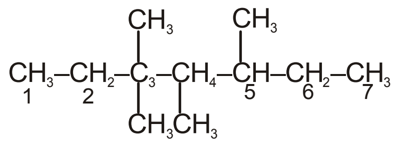
$\therefore \dfrac{X}{Y} = 3$



11. (6)

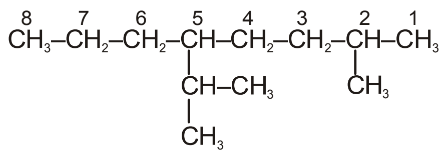


12. (A)

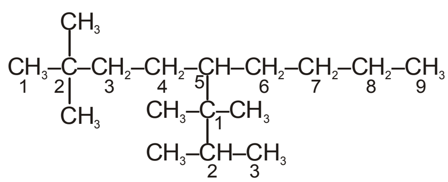


lowest set of 3,3,4,5 lo cant–

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 $C_1 C_2 = 5 = r_1 + r_2$, 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 : $^{3}C_1 \cdot {^{9}C_2} \cdot \frac{4!}{2!}$

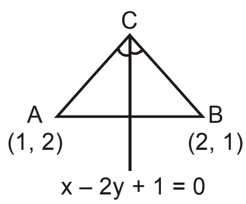
2 same, 2 same : $^{3}C_2 \cdot \frac{4!}{2!2!}$

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

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

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

28. (6)

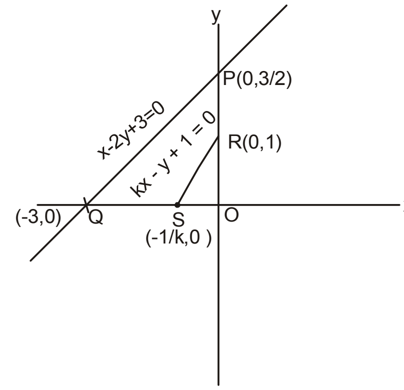
Distance between lines $3x - 4y + 4 = 0$ and $6x - 8y - 7 = 0$ (Which are parallel) is equal to diameter of the circle.

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

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

29. (2)

Points P,Q, S and R will be concyclic

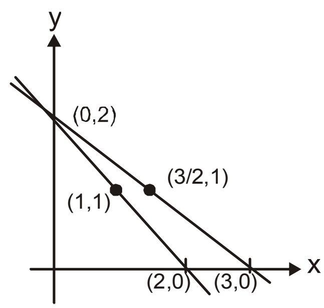


$\therefore OP \times OR = OQ \times OS$

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

$\therefore \quad k = 2$

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)

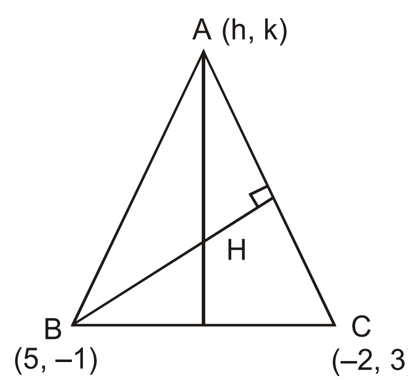
34. (C)

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

$b = \frac{2a+c}{2}$ 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. $a = -s$, $\quad v\dfrac{dv}{ds} = -s$, $\displaystyle\int_{v_0}^{0} v\,dv = -\int_{0}^{s} s\,ds$, $\quad \dfrac{v_0^2}{2} = \dfrac{s^2}{2}$ $\quad \Rightarrow s = v_0$

$\therefore$ **(B)**

40. $v_{avg} =$ slope of line PQ = $\dfrac{6-4}{5-2} = \dfrac{2}{3}$ m/s

$\therefore$ **(B)**

41. For the dropped body, $h_1 = \dfrac{1}{2}gt^2$;

For the thrown body, $h_2 = 1 \times t \times \dfrac{1}{2}gt^2 = t + \dfrac{1}{2}gt^2$;

$h_2 - h_1 = t$; So, $t = 1.8$ second.

$\therefore$ **(C)**

42. Time to cross river (t) = $\dfrac{AB}{v_{mr}\sin\theta} = \dfrac{0.4}{5\sin\theta}$

$$BC = (v_{mr}\cos\theta + v_r)t$$

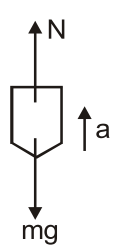
$\Rightarrow \quad 0.4 = (5\cos\theta + 1) \times \dfrac{0.4}{5\sin\theta} \quad \Rightarrow \quad 5\sin\theta - 5\cos\theta = 1$

$\Rightarrow \quad 25\sin^2\theta + 25\cos^2\theta - 50\sin\theta\cos\theta = 1 \quad \Rightarrow \quad 25\sin 2\theta = 24$

$\Rightarrow \quad \sin 2\theta = \dfrac{24}{25} \quad \Rightarrow \quad \theta = 53°$

$\therefore$ **(C)**

43. **(B)**

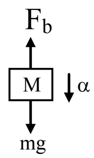


N – mg = ma

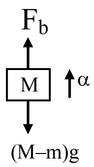
N = mg (g + a)

But $a = \dfrac{gh}{s}$

44. **[B]**



$$Mg - F_b = M\alpha \quad .....(1)$$

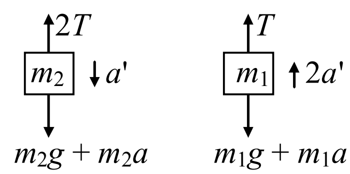


$$F_b - (M-m)\,g = (M-m)\,\alpha \quad ....(2)$$

Solving equation (1) and (2), we get $m = \frac{2\alpha}{\alpha + g} M$

45. **(2)**

Solving from the frame of the elevator



$$m_2 g + m_2 a - 2T = 2m_2 a'$$

$$T - m_1 g - m_1 a = 2m_1 a'$$

$$a' = 0$$

46. **(2)**

$av =$ constant

$$\Rightarrow \quad \frac{dv}{dt} v = k$$

$$\int_0^v v\,dv = \int_0^t k dt$$

$$\Rightarrow \quad \frac{v^2}{2} = kt$$

$$\Rightarrow v \propto \sqrt{t}$$

47. **[5]**

10 – v cos 60º = 0

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

48. **[8]**

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. The maximum value of friction force for block = $\frac{1}{5} \times 2 \times 10 = 4$N

Common acceleration (A) = $\frac{40-20}{8+2}$ = 2 m/s^2

For block, $ma = \mu mg$ = 4N

$\therefore$ **(A)**

54. Common acceleration (A) = $\frac{60-20}{8+2} = 4$ m/s^2

For block, $ma > \mu mg$, which is not possible

$\therefore$ **(A)**

55. Common acceleration (A) = $\frac{80-20}{8+2}$ = 6 m/s^2

For block $ma > \mu mg$, which is not possible.

$\therefore$ **(A)**

56. $x = t^3 - 3t^2$

position of particle is zero at t = 0 s and t = 3 s.

$\therefore$ $v = 3t^2 - 6t$

velocity of particle is zero at t = 0 s and t = 2 s.

Hence particle reverses its direction of motion at 2s.

$a = 6t - 6$

acceleration of particle is zero at t = 1s.

$\therefore$ **(A – p) ; (B – q) ; (C – s) ; (D – t)**

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