SOLUTIONS

RESHUFFLING TEST-1

GZPA-1901-1902, GZPS-1901-1902
GZ-1922-1925 & GZK-1907-1908
(JEE ADVANCED PATTERN)

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PHYSICS

1. (A)

$a^2 + b^2 - 2ab\cos\theta = 169$ .....(i)

$a^2 + 9b^2 - 6ab\cos\theta = 169$ .....(ii)

and $a^2 + 4b^2 - 4ab\cos\theta = 25$ ....(iii)

$(i) \times 3 - (ii)$

$2a^2 - 6b^2 = 338$ .....(iv)

$(i) \times 2 - (iii)$

$a^2 - 2b^2 = 313$ .....(v)

$(iv) - 2 \times (v)$

$-2b^2 = -288$

$\Rightarrow b^2 = 144 \Rightarrow b = 12$

Putting the value of b^2 in (v)

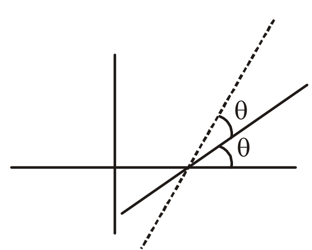
$a^2 = 501 \Rightarrow a = \sqrt{501}$

Now, put the value of a and b in equation (i) we can get the value of 'θ'

2. (A)

3. (D)

As slope of a line is $\frac{3}{4}$, means $\tan\theta = \frac{3}{4}$

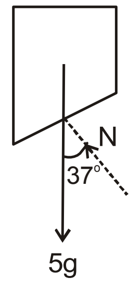


$$\tan 2\theta = \frac{2\tan\theta}{1-\tan^2\theta} = \frac{24}{7}$$

4. (D)

5. (A)

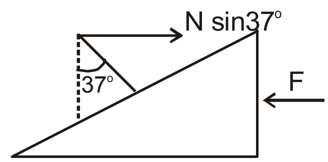
For equilibrium of 4 kg block



$$N\cos 37^{o} = 40$$

$$\Rightarrow N = 40 \times \frac{5}{4} = 50 N$$

For equilibrium of 10 kg wedge



$$N\sin 37^{o} = F$$

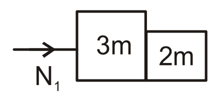
$$\Rightarrow \ 50 \times \frac{3}{5} = F$$

$$\Rightarrow \ F = 30\ N$$

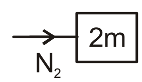
6. (D)

Taking the three blocks as a system

Acceleration of all blocks will be $\frac{F}{6m}$ towards right



$$N_1 = 5m \times \frac{F}{6m} \qquad \text{........(i)}$$



$$N_2 = 2m \times \frac{F}{6m} \qquad \text{........(ii)}$$

$(ii) \div (i)$ $\qquad \Rightarrow \frac{N_2}{N_1} = 2:5$

7. (C) **8. (C)** **9. (D)**

10. (B)

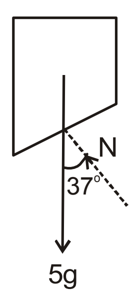
Let acceleration of 2kg block is a vertically upward. Then form wedge (surface) constraint relatin, acceleration of both surface along normal must be same.

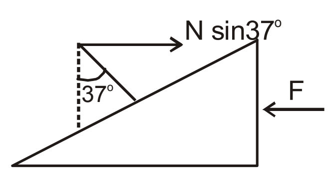
So,

$$a\cos 37^{o} = 4\sin 37^{o}$$

$$\Rightarrow a = 4 \times \tan 37^{o} = 3\ m/s^2$$

Nowm, applying $\vec{F} = \overrightarrow{ma}$ to block and wdge





$$N\cos 37^{o} - 2g = 2 \times 3$$

& $F - N\sin 37^{o} = 5 \times 4$

on solving

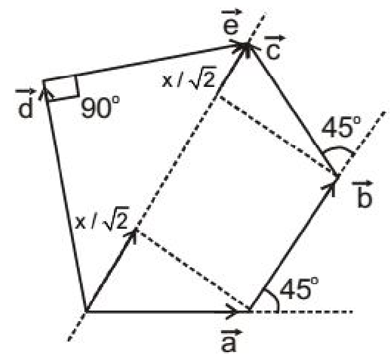
$$F = 39.5N$$

11. **(B, C)** **12.** **(A, B, D)** **13.** **(B, C, D)** **14.** **(A, B, C)**

15. **(A, B, D)** **16.** **(4)**

17. **(2)**

The resultant of $\vec{a}, \vec{b}$ and $\vec{c}$ is of magnitude $\frac{x}{\sqrt{2}} + x + \frac{x}{\sqrt{2}}$ whcih is equal to the resultant of $\vec{d}$ and $\vec{e}$.



So,

$$\sqrt{2}x + \sqrt{2}y$$

$$\Rightarrow y = \left(1 + \frac{1}{\sqrt{2}}x\right)$$

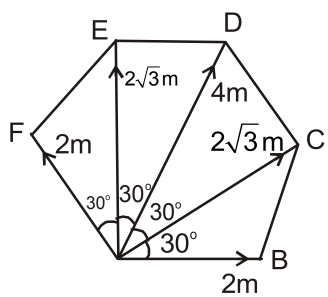
$$\Rightarrow y = \left(1 + \frac{\sqrt{2}}{2}\right)$$

so,

k = 2

18. **(6)**

$$\overrightarrow{AB} \cdot \overrightarrow{AB} + \overrightarrow{AB} \cdot \overrightarrow{AC} + \overrightarrow{AB} \cdot \overrightarrow{AD} + \overrightarrow{AB} \cdot \overrightarrow{AE} + \overrightarrow{AB} \cdot \overrightarrow{AF}$$

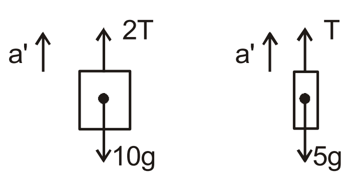


$$= 2 \times 2 + 2 \times 2\sqrt{3} \times \cos 30^\circ + 2 \times 4 \times \cos 60^\circ + 2 \times 2\sqrt{3} \times \cos 90^\circ + 2 \times 2 \times \cos/\,20^\circ$$

$$= 4 + 6 + 4 + 0 - 2 = 12 \;\; m^2$$

19. **(2)**

FBD of ‘A’ and ‘B’



As, froces and mass all are in ration 2 : 1 for blck ‘ A’ and ‘B’. So, their acceleration will be equal From constain realation

$a' + 2a' = a$

$\Rightarrow a' = 2$ m/s^2

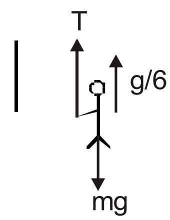
20. (4)

Let the block moves up with acceleration of a m/s^2, then as the person is moving up with acceleration $\frac{g}{6}$ relative to string. Acceleration of person in ground frame will be

$\vec{a}_{pg} = \vec{a}_{ps} + \vec{a}_{sg}$

$\Rightarrow a_{pg} = \left(\frac{-g}{6} + a\right)\downarrow$

So, $mg - T = m\left(a - \frac{g}{6}\right)$ .... (i)



and, for block

$T - \frac{mg}{2} = \frac{m}{2}a$ ....(ii)

(i) + (ii)

$\frac{mg}{2} = \frac{3ma}{2} - \frac{mg}{6}$

$\Rightarrow mg\left(\frac{1}{2} + \frac{1}{6}\right) = \frac{3ma}{2} \Rightarrow a = \frac{4g}{9}$

CHEMISTRY

21. (A)

	Mass	mole	mole ratio
C	3	$\frac{3}{12} = \frac{1}{4}$	2
O	2	$\frac{2}{16} = \frac{1}{8}$	1
S	4	$\frac{4}{32} = \frac{1}{8}$	1

$C_2O.SH_x$

$$\frac{x}{72+x}\times 100 = 7.7$$

$$x = 6$$

C_2OSH_6 mol wt = 78.

22. (A)

$$CO_2(g) + 2C(s) \longrightarrow 2CO(g)$$

1 L

(1–x) L 2x

$$1 - x + 2x = 1.5$$

$$x = 0.5$$

Vol of Co = 1 L $= \frac{1}{22.4}$ mole.

23. (D)

$$\frac{N_{(\alpha,60^\circ)}}{N_{(\alpha,90^\circ)}} = \frac{\text{Sin}^4\left(\frac{90^\circ}{2}\right)}{\text{Sin}^4\left(\frac{60^\circ}{2}\right)} \Rightarrow \frac{12}{N_{(\alpha,90^\circ)}} = \frac{\left(\frac{1}{\sqrt{2}}\right)^4}{\left(\frac{1}{2}\right)^4} = 4$$

$$\therefore N_{(\alpha,90^\circ)} = 3$$

24. (A)

$$\text{RAM} = \frac{14}{\frac{1}{5}\times 12} = 5.833$$

25. (B)

$$E_P = E\times 3^2 + \frac{1}{2}mv^2$$

$$\therefore V = \sqrt{\frac{2(E_P - 9E)}{m}}$$

26. (B)

Stopping potential = 0.5 ev $\Rightarrow$ K.E.=0.5 ev

$$E_{\text{Photon}} = \frac{hc}{\lambda} = \frac{1240}{265} = 4.68\,\text{ev}$$

$\therefore$ Work function = 4.68–0.5 = 4.18 ev

27. (D)

$$E = \frac{nhc}{\lambda}$$

or, $$40 \times 60 \times \frac{50}{100} \times \frac{1}{1.6 \times 10^{-19}} = \frac{n \times 12400}{6200}$$

$\therefore\ n = 3.75 \times 10^{21}$

28. (B)

$$\frac{hc}{\lambda} \times N_A = 194 \times 10^3$$

$$\therefore \frac{1}{\lambda} = \frac{194 \times 10^3}{6.63 \times 10^{-34} \times 3 \times 10^8 \times 6 \times 10^{23}} = 1.62 \times 10^6\ m^{-1}$$

29. (B)

No. of c-atoms $= 60 \times \frac{40}{100} \times \frac{1}{12} = 2$

Mol. formula mass = 60

2 × 12 + 2x × 1 + x ×16 = 60

(x = no. of o-atoms per molecule)

$\therefore x = 2$

$\therefore$ No. of o-atoms = 2

No. of H-atoms = 4

Hence,

Mole. formula = $C_2H_4O_2$

$\therefore$ E.F. = CH_2O

30. (A)

E_{quanta}= energy of e^- = qv = 4.5 ev

$$E = \frac{12400}{\lambda} = 12400\,\overline{V}$$

$$\therefore \overline{V} = \frac{E}{12400} = \frac{4.5}{12400} \mathring{A}^{-1} = \frac{4.5}{12400} \times 10^{10} m^{-1}$$

= $3.63 \times 10^6\ m^{-1}$

31. (B, D)

$CaCl_2 = x\,gm$

$NaCl = y\,gm$

$x + y = 4.44$

$CaO = \frac{1.12}{56} = 0.02$ mole, $CaCl_2 = 0.02 mole = 0.02 \times 111 = 2.22 g$

$NaCl = 4.44 - 2.22 = 2.22 gm.$

% of NaCl = 50 %

Mass of $CaCl_2$ = 2.22 g.

32. (A,B,CD)

33. (B,D)

$$\nu = \frac{c}{\lambda} = \frac{3 \times 10^8}{600 \times 10^{-9}} = 5 \times 10^{14} \sec^{-1}$$

$$\text{Energy of photon} = \frac{12400}{6000} = 2.07\, ev$$

$$\text{Wave number} = \frac{1}{\lambda} = \frac{1}{600 \times 10^{-9}} = 1.67 \times 10^6\, m^{-1}$$

34. (A,B,C,D)

$$\underset{\underset{L.R}{\underline{3\,mole}}}{3A} + \underset{3\,mole}{2B} \longrightarrow \frac{A_3B_2}{1\text{ mole formed}}$$

$$\frac{A_3B_2}{1\text{ mole}} + \frac{2C}{1\text{ mole}} \longrightarrow \underline{A_3B_2C_2}$$

1 mole → E.R. → left = 0.5 mole; 1 mole (2C) → L.R.; $A_3B_2C_2$ → formed = 0.5 mole

35. (A,B,C,D)

$$\frac{hc}{\lambda} = \phi + kE_{max}$$

or, $\frac{1240}{280} = 2.5 + kE_{max}$

$\therefore kE_{max} = 1.93\, ev$

and stopping potential = 1.93 volts

36. (3)

$$2NH_3 \longrightarrow N_2 + 3H_2$$

2 ml

1 ml ½ ml 3/2 ml

Total = 3 ml.

37. **(2)**

HCF of charges = $2\times10^{-18} = X\times10^{-18}$

$\therefore X = 2$

38. **(6)**

Wt. of coal = W gm

$\therefore$ wt. of $FeS_2 = 5W \times 10^{-2}$ gm

Now,

$$\frac{nFeS_2}{1}\times 0.4 = \frac{nSO_2}{2}$$

or, $\dfrac{5W\times10^{-2}}{120}\times0.4 = \dfrac{44.8}{22.4}\times\dfrac{1}{2}$

$\therefore$ W= 6000 gm = 6 Kg

39. **(5)**

In 100 gm of dried sample

$\Rightarrow$ 10gm H_2O, 50 gm silica and (100-50-10)=40 gm non volatile impurity

If W gm of original sample contained 50 gm silica and 40 gm non volatile impurities then

W = 0.28 W + 40 + 50

$\therefore W = 125\,gm$

$\therefore \%\text{ of Silica} = \dfrac{50}{125}\times100 = 40 = 8X$

$\therefore X = 5$

40. **(4)**

$$E = \frac{nhc}{\lambda}$$

or, $10^{-17} = \dfrac{n\times6.63\times10^{-34}\times3\times10^{8}}{550\times10^{-9}}$

$\therefore n \approx 28$

$\therefore \text{Ans } = \dfrac{28}{7} = 4$

MATHEMATICS

41. (D)

The value of $\tan 142^0\,30'$ lies between $\tan 135^0$ and $\tan 150^0$ i.e. between $-\frac{1}{\sqrt{3}}$ to -1.

None of the value A, B, C lies between $-\frac{1}{\sqrt{3}}$ to -1

42. (A)

Let $x = \sqrt{\frac{5}{4}+\sqrt{\frac{3}{2}}} + \sqrt{\frac{5}{4}-\sqrt{\frac{3}{2}}}$ $\Rightarrow$ $x^2 = \frac{5}{2} + 2\sqrt{\frac{25}{16}-\frac{3}{2}} = \frac{5}{2} + 2\cdot\frac{1}{4} = 3$

$\Rightarrow$ $x = \sqrt{3} = \tan\frac{\pi}{3}$.

43. (A)

We have, $a + b = \sqrt{18}$

$a - b = \sqrt{14}$

squaring & subtract, we get $4ab = 4 \Rightarrow ab = 1$

Hence number are reciprocal of each other $\Rightarrow \log_b a = -1$.

44. (C)

$\left(1+\tan k^0\right)\left(1+\tan(45-k)^0\right) = 2$

such type of 22 pair and one is $\left(1+\tan 45^0\right) = 2$

$\therefore$ Total value $= 2^{23}$

45. (B)

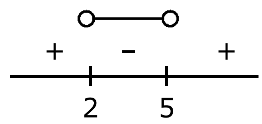
$$\tan 20^\circ + 4\sin 20^\circ = \frac{\sin 20^\circ + 4\sin 20^\circ\cdot\cos 20^\circ}{\cos 20^\circ} = \frac{\sin 20^\circ + 2\sin 40^\circ}{\cos 20^\circ}$$
$$= \frac{\sin 20^\circ + \sin 40^\circ + \sin 40^\circ}{\cos 20^\circ} = \frac{\sin 80^\circ + \sin 40^\circ}{\cos 20^\circ}$$
$$= \frac{2\cdot\sin 60^\circ\cdot\cos 20^\circ}{\cos 20^\circ} = \sqrt{3}$$

46. (B)

$\sin 47^\circ + \sin 61^\circ - \sin 11^\circ - \sin 25^\circ$

$= 2\sin 54^\circ\cdot\cos 7^\circ - 2\sin 18^\circ\cdot\cos 7^\circ = 2\cos 7^\circ\left[\frac{\sqrt{5}+1}{4} - \frac{\sqrt{5}-1}{4}\right] = \cos 7^\circ$

47. **(B)**



$\therefore$ Positive integral solutions = {3, 4} i.e. two

48. **(B)**

From 3 tanA + 4 = 0, we get tanA = – 4/3, so that

$$\sin A = \frac{-\tan A}{\sqrt{1+\tan^2 A}} = \frac{4/3}{\sqrt{1+16/9}} = \frac{4}{5} \quad [\because \sin A > 0 \text{ and } \tan A < 0 \text{ in quad.II}]$$

$$\text{and } \cos A = -\frac{1}{\sqrt{1+\tan^2 A}} = -\frac{3}{5} \quad [\because \cos A \text{ is negative in quad. II}]$$

$$\text{Hence } 2\cot A - 5\cos A + \sin A = 2\left(-\frac{3}{4}\right) - 5\left(-\frac{3}{5}\right) + \frac{4}{5} = \frac{23}{10}$$

49. **(C)**

$|x-1| + |x-2| \geq 4$

50. **(C)**

According to property $|f(x)| = -f(x)$, then $f(x) \leq 0$

$$|x-1|\,|x-2| = -(x-2)(x-1) \Rightarrow (x-1)(x-2) \leq 0 \Rightarrow 1 \leq x \leq 2$$

$\therefore$ Option (C) is correct.

51. **(A, D)**

We have,

$$9^{\log_3(\log_2 x)} = \log_2 x - (\log_2 x)^2 + 1$$

$$\Rightarrow 3^{2\log_3(\log_2 x)} = \log_2 x - (\log_2 x)^2 + 1 \Rightarrow 3^{\log_3(\log_2 x)^2} = \log_2 x - (\log_2 x)^2 + 1$$

$$\Rightarrow (\log_2 x)^2 = \log_2 x - (\log_2 x)^2 + 1 \Rightarrow 2(\log_2 x)^2 - \log_2 x - 1 = 0$$

$$\Rightarrow (2\log_2 x + 1)(\log_2 x - 1) = 0$$

$$\Rightarrow \log_2 x = -\frac{1}{2}, \log_2 x = 1 \Rightarrow x = 2^{-1/2}, 2$$

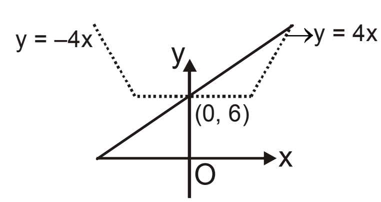
52. **(A,C,D)**

When

(i) P = 0 then it has infinte solution

(ii) if –4 < P < 0 or 0 < P < 4 then it intersect at 2 points

(iii) P $\geq$ 4 or P $\leq$ –4 then it has only one solution



53. (A, C, D)

As $\frac{2+\sqrt{3}}{2-\sqrt{3}} > 1 \Rightarrow \log_{0.5}\left(\frac{2+\sqrt{3}}{2-\sqrt{3}}\right) < 0$.

As, $\sqrt{65} > 8 \Rightarrow \sqrt{65} - 7 > 1 \Rightarrow \log_{12}\left(\sqrt{65}-7\right) > 0$.

Also, $\log_2\left(\frac{\log_3}{\log_5} \times \frac{\log_5}{\log_7} \times \frac{\log_7}{\log_3}\right) = \log_2 1 = 0.$

As, $\log_7\left(\frac{3}{2}\right)^{\frac{-2}{3}} = \log_7\left(\frac{2}{3}\right)^{\frac{2}{3}} = \frac{2}{3}\log_7\frac{2}{3} < 0$. **Ans.**]

54. (A,B,C,D)

$\sin^2 x - \cos^2 x = -\cos 2x \le 1$

$\sqrt{\frac{6}{5}}\left(\frac{1}{\sqrt{2}}\sin x + \frac{1}{\sqrt{3}}\cos x\right) = \frac{\sqrt{3}}{\sqrt{5}}\sin x + \frac{\sqrt{2}}{\sqrt{5}}\cos x$

$= \sin x \,.\, \sin\phi + \cos x \cos\phi$ where $\sin\phi = \frac{\sqrt{3}}{\sqrt{5}}$, $\cos\phi = \frac{\sqrt{2}}{\sqrt{5}}$

$= \cos(x - \phi) \le 1$

$= \cos^6 x + \sin^6 x = (\cos^2 x)^3 + (\sin^2 x)^3$

$= 1 - 3\sin^2 x \cos^2 x = 1 - \frac{3}{4}(\sin 2x)^2$

$= \le 1$

$= \cos^2 x + \sin^2 x = 1 - \frac{(\sin 2x)^2}{4} \le 1$

55. (B, C)

$x \sin\theta = y\left(-\frac{1}{2}\sin\theta + \frac{\sqrt{3}}{2}\cos\theta\right) \Rightarrow \frac{x}{y} = \frac{\sqrt{3}}{2}\cot\theta - \frac{1}{2}$

similarly $\frac{x}{z} = -\frac{\sqrt{3}}{2}\cot\theta - \frac{1}{2} \Rightarrow$ on adding $\frac{x}{z} + \frac{x}{y} = -1 \Rightarrow xy + yz + zx = 0$

56. (9)

We have,

$2^{2x} - 8 \cdot 2^x + 15 = 0 \Rightarrow (2^x - 3)(2^x - 5) = 0 \Rightarrow 2^x = 3$ or $2^x = 5$

Hence smallest x is obtained by equating $2^x = 3 \Rightarrow x = \log_2 3$

So, $p = \log_2 3$

Hence, $4^p = 2^{2\log_2 3} = 2^{\log_2 9} = 9$. **Ans.**]

57. **(4)**

$$S = \frac{1}{\cos\alpha} + \frac{2\cos\alpha}{\cos 2\alpha} = \frac{2\sin\alpha}{2\sin\alpha\cos\alpha} + \frac{2\cos\alpha}{\cos 2\alpha} = \frac{2\sin\alpha}{\sin 2\alpha} + \frac{2\cos\alpha}{\cos 2\alpha}$$

$$= \frac{2\cdot 2(\sin\alpha\cos 2\alpha + \cos\alpha\sin 2\alpha)}{2\sin 2\alpha\cos 2\alpha} = 4\frac{\sin 3\alpha}{\sin 4\alpha} = 4$$ **Ans.** if $\alpha = \frac{\pi}{7}$]

58. **(2)**

Given that a sec (200°) – c tan (200°) = d

$\Rightarrow$ a = c sin (200°) + d(cos 200°) ....(1)

And b sec (200°) + d tan (200°) = c

$\Rightarrow$ b = c cos (200°) – d sin (200°) ....(2)

Now on squaring and adding (1) and (2) , we get $a^2 + b^2 = c^2 + d^2$ ....(3)

Also (1) × c – (2) × d $\Rightarrow$ (ac – bd) = $(c^2 + d^2)$ sin (200°) $\Rightarrow$ $\sin 20° = \frac{(bd - ac)}{c^2 + d^2}$ ....(4)

Hence $\left(\frac{a^2 + b^2 + c^2 + d^2}{bd - ac}\right)\sin 20° = \frac{2(c^2 + d^2)}{(bd - ac)} \times \frac{(bd - ac)}{(c^2 + d^2)} = 2$ (Using (3) and (4))]

59. (1)

Let x + | x – 2 | = y

$\therefore$ Equation becomes $\log_x y^2 = \log_x(5y - 6) \Rightarrow y^2 = 5y - 6 \Rightarrow y^2 - 5y + 6 = 0 \Rightarrow y = 2$ or 3

If y = 2

then $x + |x - 2| = 2 \Rightarrow 0 < x < 1 \cup 1 < x \le 2$

If y = 3

then $x + |x - 2| = 3 \Rightarrow x = \frac{5}{2}$ only

Hence number of integral solutions is 1.

60. **(1)**

$x^2 - 4x \ge 0 \Rightarrow x \in (-\infty, 0] \cup [4, \infty)$

$x - 3 > 0 \Rightarrow x \in (3, \infty)$

$x^2 - 4x < x^2 + 9 - 6x$

$\Rightarrow x < \frac{9}{2}$ **Ans.** $x \in [4, 9/2)$