

# **SOLUTIONS**

## **RESHUFFLING TEST-1**

**GZBS-1904 & 1905**

**(JEE ADVANCED PATTERN)**

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## PHYSICS

1. (A)

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

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

$$\text{and } a^2 + 4b^2 - 4ab \cos \theta = 25 \quad \dots(iii)$$

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

$$2a^2 - 6b^2 = 338 \quad \dots(iv)$$

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

$$a^2 - 2b^2 = 313 \quad \dots(v)$$

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

$$-2b^2 = -288$$

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

Putting the value of  $b^2$  in (v)

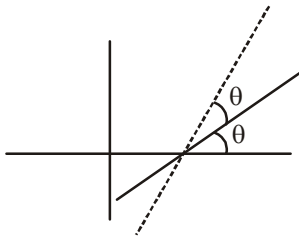
$$a^2 = 501 \Rightarrow a = \sqrt{501}$$

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

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. (C)

5. (A)

For equilibrium of 4 kg block

$$N \cos 37^\circ = 40$$

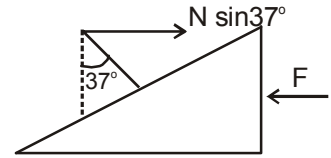
$$\Rightarrow N = 40 \times \frac{5}{4} = 50 \text{ N}$$

For equilibrium of 10 kg wedge

$$N \sin 37^\circ = F$$

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

$$\Rightarrow F = 30 \text{ N}$$

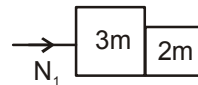


6. (D)

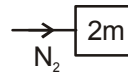
Taking the three blocks as a system

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

$$N_1 = 5m \times \frac{F}{6m} \quad \dots\dots(i)$$



$$N_2 = 2m \times \frac{F}{6m} \quad \dots\dots(ii)$$



$$(ii) \div (i)$$

$$\Rightarrow \frac{N_2}{N_1} = 2 : 5$$

7. (C)

8. (D)

9. (A)

10. (A)

11. (B, C)

12. (A, C, D)

13. (A, B)

14. (C, D)

15. (A, B, D)

16. (4)

17. (2)

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

So,

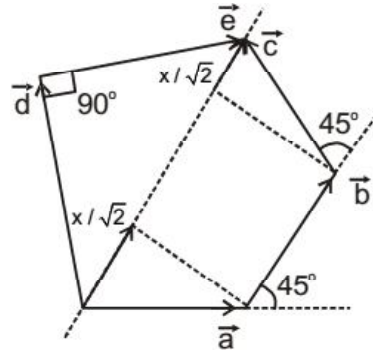
$$\sqrt{2}x + \sqrt{2}y$$

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

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

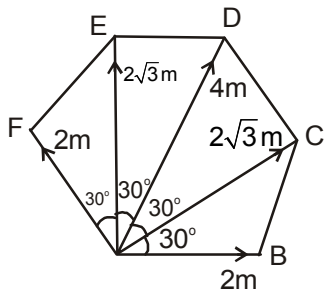
so,

$$k = 2$$



18. (6)

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



$$= 2 \times 2 + 2 \times 2\sqrt{3} \times \cos 30^\circ + 2 \times 4 \times \cos 60^\circ + 2 \times 2\sqrt{3} \times \cos 90^\circ + 2 \times 2 \times \cos 120^\circ$$

$$= 4 + 6 + 4 + 0 - 2 = 12 \text{ m}^2$$

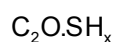
19. (5)

20. (5)

## CHEMISTRY

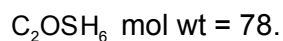
21. (A)

	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

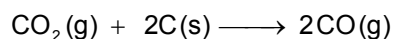


$$\frac{x}{72+x} \times 100 = 7.7$$

$$x = 6$$



22. (A)



1 L

(1-x) L                      2x

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

$$x = 0.5$$

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

23. (D)

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

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

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)

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

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

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

28. (B)

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

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

29. (B)

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

Mol. formula mass = 60

$$2 \times 12 + 2x \times 1 + x \times 16 = 60$$

(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)

$E_{\text{quanta}}$  = energy of  $e^-$  =  $qv = 4.5 \text{ eV}$

$$E = \frac{12400}{\lambda} = 12400 \bar{V}$$

$$\therefore \bar{V} = \frac{E}{12400} = \frac{4.5}{12400} \text{ A}^{\circ-1} = \frac{4.5}{12400} \times 10^{10} \text{ m}^{-1}$$

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

31. (B, D)

$CaCl_2 = x \text{ gm}$

$NaCl = y \text{ gm}$

$x + y = 4.44$

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

$NaCl = 4.44 - 2.22 = 2.22 \text{ gm}$ .

% of  $NaCl = 50 \%$

Mass of  $CaCl_2 = 2.22 \text{ g}$ .

32. (A,B,CD)

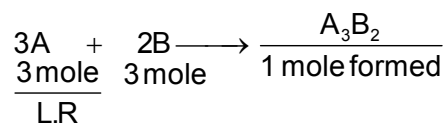
33. (B,D)

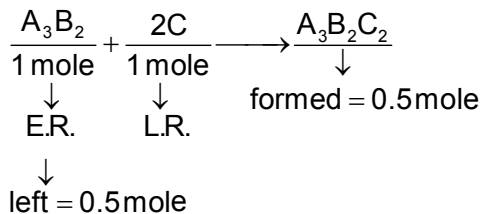
$$v = \frac{c}{\lambda} = \frac{3 \times 10^8}{600 \times 10^{-9}} = 5 \times 10^{14} \text{ sec}^{-1}$$

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

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

34. (A,B,C,D)





35. (A,B,C,D)

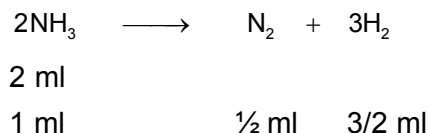
$$\frac{hc}{\lambda} = \phi + kE_{\max}$$

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

$$\therefore kE_{\max} = 1.93 \text{ eV}$$

and stopping potential = 1.93 volts

36. (3)



Total = 3 ml.

37. (2)

$$\text{HCF of charges} = 2 \times 10^{-18} = X \times 10^{-18}$$

$$\therefore X = 2$$

38. (6)

Wt. of coal = W gm

$$\therefore \text{wt. of FeS}_2 = 5W \times 10^{-2} \text{ gm}$$

Now,

$$\frac{n\text{FeS}_2}{1} \times 0.4 = \frac{n\text{SO}_2}{2}$$

$$\text{or, } \frac{5W \times 10^{-2}}{120} \times 0.4 = \frac{44.8}{22.4} \times \frac{1}{2}$$

$$\therefore W = 6000 \text{ gm} = 6 \text{ Kg}$$

39. (5)

In 100 gm of dried sample

⇒ 10 gm H<sub>2</sub>O, 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

$$W = 0.28 W + 40 + 50$$

$$\therefore W = 125 \text{ gm}$$

$$\therefore \% \text{ of Silica} = \frac{50}{125} \times 100 = 40 = 8 X$$

$$\therefore X = 5$$

40. (4)

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

$$\text{or, } 10^{-17} = \frac{n \times 6.63 \times 10^{-34} \times 3 \times 10^8}{550 \times 10^{-9}}$$

$$\therefore n \approx 28$$

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

## MATHEMATICS

41. (D)

The value of  $\tan 142^\circ 30'$  lies between  $\tan 135^\circ$  and  $\tan 150^\circ$  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)

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

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

43. (A)

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

$$a - b = \sqrt{14}$$

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

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

44. (C)

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

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

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

45. (B)

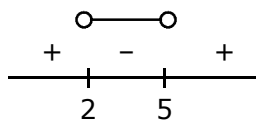
$$\begin{aligned} \tan 20^\circ + 4 \sin 20^\circ &= \frac{\sin 20^\circ + 4 \sin 20^\circ \cdot \cos 20^\circ}{\cos 20^\circ} = \frac{\sin 20^\circ + 2 \sin 40^\circ}{\cos 20^\circ} \\ &= \frac{\sin 20^\circ + \sin 40^\circ + \sin 40^\circ}{\cos 20^\circ} = \frac{\sin 80^\circ + \sin 40^\circ}{\cos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

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  $3 \tan A + 4 = 0$ , we get  $\tan A = -4/3$ , 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,

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

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

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

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

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

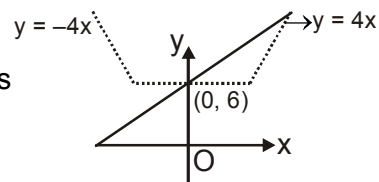
52. (A, C, D)

When

(i)  $P = 0$  then it has infinite solution

(ii) if  $-4 < P < 0$  or  $0 < P < 4$  then it intersects at 2 points

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



53. (A, C, D)

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

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

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

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

54. (A,B,C,D)

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

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

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

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

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

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

$$= \leq 1$$

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

55. (B, C)

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

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

56. (9)

We have,

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

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

$$\text{So, } p = \log_2 3$$

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

57. (4)

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

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

58. (2)

Given that  $a \sec(200^\circ) - c \tan(200^\circ) = d$ 

$$\Rightarrow a = c \sin(200^\circ) + d(\cos 200^\circ) \quad \dots(1)$$

And  $b \sec(200^\circ) + d \tan(200^\circ) = c$ 

$$\Rightarrow b = c \cos(200^\circ) - d \sin(200^\circ) \quad \dots(2)$$

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

$$\text{Also } (1) \times c - (2) \times d \Rightarrow (ac - bd) = (c^2 + d^2) \sin(200^\circ) \Rightarrow \sin 20^\circ = \frac{(bd - ac)}{c^2 + d^2}$$

....(4)

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

59. (1)

Let  $x + |x - 2| = y$ 
 $\therefore$  Equation becomes  $\log_x y^2 = \log_x(5y - 6) \Rightarrow y^2 = 5y - 6 \Rightarrow y^2 - 5y + 6 = 0 \Rightarrow y = 2 \text{ or } 3$ 
If  $y = 2$ then  $x + |x - 2| = 2 \Rightarrow 0 < x < 1 \cup 1 < x \leq 2$ If  $y = 3$ then  $x + |x - 2| = 3 \Rightarrow x = \frac{5}{2}$  only

Hence number of integral solutions is 1.

60. (1)

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

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

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

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