

# **SOLUTIONS**

## **WEEKLY TEST-2**

**GZPA-1901 & 1902**

**(MAIN PATTERN)**

**Test Date: 22-07-2017**



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## PHYSICS

1. (C)

Resultant of two vectors  $\vec{A}$  and  $\vec{B}$  can be given by  $\vec{R} = \vec{A} + \vec{B}$

$$|\vec{R}| = |\vec{A} + \vec{B}| = \sqrt{A^2 + B^2 + 2AB\cos\theta}$$

If  $\theta = 0^\circ$  then  $|\vec{R}| = A + B = |\vec{A}| + |\vec{B}|$

2. (A)

For 17N both the vector should be parallel *i.e.* angle between them should be zero. For 7N both the vectors should be antiparallel *i.e.* angle between them should be  $180^\circ$ . For 13N both the vectors should be perpendicular to each other *i.e.* angle between them should be  $90^\circ$ .

3. (D)

$$P = \sqrt{P^2 + Q^2 + 2PQ\cos\theta}$$

$$Q^2 + 2PQ\cos\theta = 0$$

$$2P\cos\theta + Q = 0$$

$$\text{Angle } \Rightarrow \quad \tan\alpha = \frac{2P\sin\theta}{Q + 2P\cos\theta}$$

$$\tan\alpha = \frac{2P\sin\theta}{0} = \infty$$

$$\alpha = 90^\circ$$

4. (D)

If two vectors A and B are given then Range of their resultant can be written as  $(A - B) \leq R \leq (A + B)$ .

*i.e.*  $R_{\max} = A + B$  and  $R_{\min} = A - B$

If  $B = 1$  and  $A = 4$  then their resultant will lie in between 3N and 5N. It can never be 2N.

5. (B)

6. (C)

7. (C)

$$2v\sin\left(\frac{60^\circ}{2}\right) = v$$

8. (A)

9. (C)

10. (A)

11. (B)

12. (B)

13. (C)

14. (C)

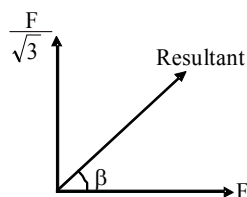
15. (C)

$$\frac{\vec{A} \cdot \vec{B}}{B} = \frac{2+1-1}{\sqrt{1+1+1}} = \frac{2}{\sqrt{3}}$$

16. (B)

17. (D)

18. (A)



$$\tan \beta = \frac{\frac{F}{\sqrt{3}} \sin 90^\circ}{F + \frac{F}{\sqrt{3}} \cos 90^\circ} = \frac{F}{F\sqrt{3}} = \frac{1}{\sqrt{3}}$$

$$\beta = 30^\circ$$

19. (B)

20. (C)

21. (B)

22. (A)

23. (A)

24. (B)

25. (A)

26. (A)

27. (A)

28. (B)

The resultant is  $\vec{R} = \hat{j}$ 

$$\vec{R} = \hat{i} - 2\hat{j} + 2\hat{k} + 2\hat{i} + \hat{j} - \hat{k} + \vec{c}$$

$$\text{or } \hat{j} = 3\hat{i} - \hat{j} + \hat{k} + \vec{c}$$

$$\therefore \vec{c} = -3\hat{i} + 2\hat{j} - \hat{k}$$

29. (C)

$$\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = 1$$

$$\text{or } \cos^2 60^\circ + \cos^2 60^\circ + \cos^2 \gamma = 1$$

$$\text{or } \frac{1}{4} + \frac{1}{4} + \cos^2 \gamma = 1 \quad \text{or } \cos^2 \gamma = 1 - \frac{1}{2} = \frac{1}{2} \quad \text{or } \cos \gamma = \frac{1}{\sqrt{2}} \quad \Rightarrow \gamma = \frac{\pi}{4}$$

$$\therefore n = 4$$

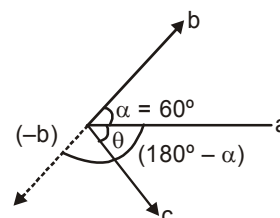
30. (C)

Let  $c = a - b$ 

$$\therefore \tan \theta = \frac{b \sin \alpha}{a - b \cos \alpha}$$

$$\text{or } \tan \theta = \frac{6 \sin 60^\circ}{10 - 6 \cos 60^\circ} = \frac{3\sqrt{3}}{7}$$

$$\therefore \theta = \tan^{-1} \left( \frac{3\sqrt{3}}{7} \right)$$



## CHEMISTRY

- |         |         |         |         |
|---------|---------|---------|---------|
| 31. (A) | 32. (B) | 33. (B) | 34. (B) |
| 35. (D) | 36. (C) | 37. (B) | 38. (B) |
| 39. (C) | 40. (A) | 41. (B) | 42. (A) |
| 43. (C) | 44. (D) | 45. (C) |         |
| 46. (A) |         |         |         |

$\therefore$  0.224L mass 0.44g

$$\therefore 22.44\text{L mass} = \frac{0.44 \times 22.4}{0.224} = 44\text{g (i.e., N}_2\text{O)}$$

47. (B)

44g CO<sub>2</sub> = N molecules,

$\therefore$  4.4g CO<sub>2</sub> = N/10 molecules,

22.4 litre H<sub>2</sub> at STP = N molecules,

$\therefore$  2.24 litre H<sub>2</sub> at STP = N/10 molecules,

$$\text{Thus, total molecules} = \frac{N}{10} + \frac{N}{10} = \frac{N}{5} = \frac{6.023}{5} \times 10^{23}$$

48. (A)

Atoms in 1 molecule of C<sub>12</sub>H<sub>22</sub>O<sub>11</sub> = 45

$\therefore$  Atoms in N molecule = 45N

49. (D)

$$1 \text{ mg C}_4\text{H}_{10} = \frac{14N}{58} \times 10^{-3} \text{ atoms,}$$

$$1 \text{ mg N}_2 = \frac{2N \times 10^{-3}}{28} \text{ atoms,}$$

$$1 \text{ mg Na} = \frac{N \times 10^{-3}}{23} \text{ atoms,}$$

$$1 \text{ mL} = 1 \text{ g H}_2\text{O} = \frac{3N}{18} \text{ atoms}$$

( $\therefore$  mg of a substance = N molecules = a  $\times$  N atoms)

where a is number of atoms in one molecule.

50. (B)

51. (A)

${}_6\text{C}^{12}$  contains 6N protons, 5N electrons and neutrons.

52. (C)

53. (B)

8 mole of O-atom = 1 mole  $\text{Mg}_3(\text{PO}_4)_2$

$$0.25 \text{ mole of O-atom} = \frac{1 \times 0.25}{8}$$

$$= 3.125 \times 10^P \text{ mole of } \text{Mg}_3(\text{PO}_4)_2$$

54. (D)

55. (D)

Silica	Water	Clay	Mineral
45	12	43	Initial %
a	8	(92-a)	% after heating

The % ratio of silica and clay remains constant on heating i.e.,  $\frac{45}{43} = \frac{a}{92-a} \Rightarrow a = 47\%$

56. (C)

$$9 + 1 + 3.5 = 13.5$$

$$\therefore 13.5\text{g contains } \frac{9}{12} \text{ mole}$$

$$\therefore 108\text{g contains } \frac{9 \times 108}{12 \times 13.5}$$

$$= 6 \text{ mole carbon i.e., } \text{C}_6\text{H}_8\text{N}_2$$

57. (B)

58. (D)

$$\text{g-atom of } X = \frac{75.8}{75} \text{ and g-atom of } Y = \frac{24.2}{16}$$

59. (C)

$$35.5 = \frac{35 \times x + 37 \times (100 - x)}{100} \text{ or } x = 75$$

60. (C)

Average molecular weight of dry air is 28.8 which is more than molecular weight of water.

## MATHEMATICS

61. (A)

From Venn-Euler's diagram,

$$\therefore (A - A) \cup (B - A) \cup (A \cap B) = A \cup B.$$

62. (C)

Since  $A \subseteq B$ ,  $\therefore A \cup B = B$ .

$$\text{So, } n(A \cup B) = n(B) = 6.$$

63. (C)

$$x^2 - 5x + 6 \leq 0 \quad \Rightarrow \quad x \in [2, 3]$$

64. (A)

$$x^2 - 3|x| + 2 = 0$$

$$\Rightarrow |x| = 1, 2 \quad \Rightarrow \quad x = \pm 1, \pm 2.$$

65. (A)

Given  $n(N) = 12, n(P) = 16, n(H) = 18$ ,

$$n(N \cup P \cup H) = 30$$

From,  $n(N \cup P \cup H) = n(N) + n(P) + n(H)$ 

$$-n(N \cap P) - n(P \cap H) - n(N \cap H)$$

$$+n(N \cap P \cap H)$$

$$\therefore n(N \cap P) + n(P \cap H) + n(N \cap H) = 16$$

Now, number of pupils taking two subjects

$$= n(N \cap P) + n(P \cap H) + n(N \cap H) - 3n(N \cap P \cap H)$$

$$= 16 - 0 = 16.$$

66. (A)

$$2x - x^2 + 11 \geq x^2 + 2x + 3$$

$$2x^2 - 8 \leq 0$$

$$x^2 - 4 \leq 0$$

$$x \in [-2, 2]$$

67. (A)

$$x - 3 > 0 \quad \Rightarrow \quad x > 3 \quad \text{and} \quad x - 2 > 0 \quad \Rightarrow \quad x > 2$$

$$\Rightarrow x > 3$$

68. (D)

$$|4 - 3x| \leq \frac{1}{2} \Rightarrow -\frac{1}{2} \leq 4 - 3x \leq \frac{1}{2}$$

$$4 - 3x \leq \frac{1}{2} \text{ and } 4 - 3x \geq -\frac{1}{2}$$

$$\frac{7}{2} - 3x \leq 0; \frac{9}{2} - 3x \geq 0$$

$$x \geq \frac{7}{6}; x \leq \frac{3}{2}$$

$$x \in \left[ \frac{7}{6}, \frac{3}{2} \right]$$

∴ Option (D) is correct.

69. (C)

$$f(-1) = 0 + 9 + 2 = 11, f(2) = 3 + 0 + 5 = 8, f(-3) = 2 + 15 + 0 = 17$$

70. (C)

$$\frac{4 - 4x + 2 + 2x}{(1+x)(1-x)} - 1 < 0 \quad \Rightarrow \quad \frac{6 - 2x - 1 + x^2}{(1+x)(1-x)} < 0$$

$$\Rightarrow \frac{x^2 - 2x + 5}{(x+1)(x-1)} > 0$$

$$\Rightarrow \frac{1}{(x+1)(x-1)} > 0$$

71. (A)

$$3 < |x - 1| < 5 \quad \Rightarrow \quad x \in (-4, -2) \cup (4, 6)$$

72. (A)

73. (D)

$$\text{We have, } 5x + 2 < 3x + 8 \text{ and } \frac{x+2}{x-1} < 4$$

$$\Rightarrow 2x - 6 < 0 \text{ and } \frac{x+2}{x-1} - 4 < 0$$

$$\Rightarrow 2(x-3) < 0 \text{ and } \frac{-3x+6}{x-1} < 0 \Rightarrow x-3 < 0 \text{ and } \frac{x-2}{x-1} > 0$$

$$\Rightarrow x \in (-\infty, 3) \text{ and } x \in (-\infty, 1) \cup (2, \infty) \Rightarrow x \in (-\infty, 1) \cup (2, 3)$$

74. (B)

$$\text{Case I: When } 2x - 3 \geq 0 \text{ i.e., } x \geq \frac{3}{2}$$

In this case, we have

$$|2x - 3| = 2x - 3$$

$$\therefore |2x - 3| < x - 1 \Rightarrow 2x - 3 < x - 1 \Rightarrow x - 2 < 0 \quad \Rightarrow \quad x < 2$$

$$\Rightarrow x \in [3/2, 2) \quad [\because x \geq 3/2]$$

**Case II :** When  $2x - 3 < 0$  i.e.,  $x < \frac{3}{2}$

In this case, we have

$$|2x - 3| = -(2x - 3)$$

$$\therefore |2x - 3| < x - 1 \Rightarrow -(2x - 3) < x - 1 \Rightarrow 3x - 4 > 0 \Rightarrow x > 4/3$$

$$\Rightarrow x \in (4/3, 3/2) \quad [\because x < 3/2]$$

Thus, the set of the values of  $x$  satisfying the given inequation is  $(4/3, 3/2) \cup [3/2, 2) = (4/3, 2)$

75. (C)

76. (A)

77. (A)

78. (B)

79. (C)

80. (B)

$$\frac{x^2}{x-1} \leq 0 \Rightarrow x \in (-\infty, 1)$$

81. (A)

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

$$-6 \leq |x - 1| \leq 2$$

$$-2 \leq x - 1 \leq 2$$

$$-1 \leq x \leq 3$$

82. (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.

83. (C)

$$A \cup B = \{a, b, c, d, e, f, l, m\} (\because A = \{a, b, d, e, l\}, B = \{c, d, f, m\})$$

$$C \cap (A \cup B) = \{a, l, m\}.$$

Hence (C) is the correct answer.

84. (A)

85. (C)



86. (B)

$$\frac{(x-3)^3}{(x-4)(x-1)(\sqrt{2}-x)(\sqrt{2}+x)} \leq 0$$

$$x \in (-\sqrt{2}, 1) \cup (\sqrt{2}, 3] \cup (4, \infty)$$

87. (C)

88. (C)

89. (A)

90. (D)

$$|x| \left( \frac{1+|x|}{x^2+x+1} \right) \leq 0 \Rightarrow x=0$$