SOLUTIONS

PROGRESS TEST-1

GZ-1926 & GZK-1909

(JEE MAIN PATTERN)

Test Date: 24-09-2017

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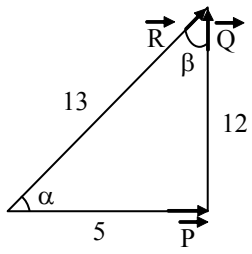
PHYSICS

1. (C)



$\cos\beta = \frac{12}{13}$ $\quad\therefore\quad \beta = \cos^{-1}\left(\frac{12}{13}\right)$

2.	**(D)**	**3.**	**(B)**	**4.**	**(D)**	**5.**	**(C)**
6.	**(A)**	**7.**	**(B)**	**8.**	**(C)**	**9.**	**(B)**
10.	**(D)**	**11.**	**(A)**	**12.**	**(B)**	**13.**	**(A)**
14.	**(A)**	**15.**	**(B)**	**16.**	**(B)**	**17.**	**(B)**
18.	**(C)**	**19.**	**(A)**	**20.**	**(A)**	**21.**	**(C)**
22.	**(B)**	**23.**	**(B)**	**24.**	**(A)**	**25.**	**(B)**
26.	**(A)**	**27.**	**(D)**	**28.**	**(A)**	**29.**	**(A)**
30.	**(C)**						

CHEMISTRY

31. (C)

C ball 1400 can be used for 700

H ball 3600 can be used for 600

O ball 1000 can be used for 1000

Max possible is 600

32. (A)

Wt of carbon 1×10^{-6} gm

Mole of carbon = 1×10^{-6} /12

Atom of carbon $=\frac{.000001\times6.023\times10^{23}}{12} = 5\times10^{16}$

33. (B)

Molecular wt. = 12 x 3 + 16 x 4 + 14 = 114

34. (A)

Molecular wt. = $\frac{4x24x100}{0.096}$=100000

35. (C)

12 + 16x + 40 = $\frac{x16}{48}X100$

X = 3

36. (A)

$n_{O_2} = \frac{16}{32} = \frac{1}{2}$ & $n_{N_2} = \frac{14}{28} = \frac{1}{2}$

37. (B)

No. of mole = $\frac{32.2}{322} = 0.1$

No. of mole of O - atom = 0.1 × 14 = 1.4

Weight of oxygen = 1.4 × 16 = 22.4 g.

38. (D)

1 L H_2O = 1000 g H_2O

No. of mole of H_2O = $\frac{1000}{18} = 55.55$

No. of H_2O molecule = $55.55N_A$

39. (A)

3 mole oxygen = 1 mole of $BaCO_3$

1.5 mole = 0.5 mole of $BaCO_3$

40. (B)

41. (B)

$1 \times n_{CO_2} = 6 \times n_{K_4[Fe(CN)_6]}$

$\therefore \quad n_{K_4[Fe(CN)_6]} = \frac{1}{6}$

42. (C)

4 g sulphur is in 100 g compound, hence 32 g sulphur is in = $\left(\frac{100}{4} \times 32\right) = 800$ g/mol compound.

43. (D)

No. of molecules = $\frac{W}{MW} \times N$

44. (B)

$2.32481 \times 10^{-23} g = 2.32481 \times 10^{-23} \times 6.023 \times 10^{23}$ amu $= 14$ amu.

45. (A)

$H_2O = 1\,mol = 18\,g$

$NH_2CONH_2 = 1mole = 60\,g$

$\%\ H_2O = \frac{18}{18+60} \times 100 = 23.01$

46. (B)

$50\,g\ Fe \equiv\ 50\ g$

$5\ mole\ N_2 = 5 \times 28 = 140\ g$

$1\,g\ atom\ Ag = 108\,g$

$5 \times 10^{23}\ atom\ of\ carbon = \frac{5}{6} \times 12 = 10\,g$

47. (C)

$1\ atom = 3.986 \times 10^{-23}$

$6.023 \times 10^{23}\ atom = 3.986 \times 10^{-23} \times 6.02 \times 10^{23} = 24$

48. (C)

S : O

1 : 1.5 by mass

$\frac{1}{32} : \frac{1.5}{16}$ by mole

1 : 3 by mole

SO_3

49. (B)

(A) $\frac{3.2}{32} = 0.1$ mole O_2 O atom = 0.2 mole

(B) 0.75 mole N_2 N atom = 1.5 mole

(C) 1000 amu He H atom = 250 atom S

(D) $\frac{2.24}{22.4} = 0.1\,mole\ CH_4$ Total atom = $5 \times 0.1 = 0.5$ mole

50. (C)

(A) No of mole $= \frac{6.72}{22.4} = 0.3$ mole NH_3

(B) No of mole $= \frac{0.8}{2} = 0.4$ mole H_2

(C) No of mole $= \frac{12}{48} = 0.25$ mole O_3

(D) No of mole $= \frac{14}{28} = 0.5$ mole N_2

51. (D)

$$\text{mole of } O_2 = \frac{3.2}{32} = 0.1$$

$$= 0.1 \times 6.0.23 \times 10^{23} \text{ molecules}$$

$$= 16 \times 0.1 \times 6.023 \times 10^{23} \text{ e} = 9.64 \times 10^{23} \text{ e}$$

52. (B)

Molar mass = $6.644 \times 10^{-23} \times 6.023 \times 10^{23} = 40$

$$\text{Number of moles} = \frac{40 \times 1000}{40} = 1000 \text{mole}$$

53. (A)

$$n = \frac{w}{M} = \frac{200 \times 13.6}{200} = 13.6 \text{ mole}$$

54. (D)

$$\frac{100 \times 2}{M_{acid} + 107 \times 2} = \frac{27}{108}$$

$$M_{acid} + 214 = 800$$

$$M_{acid} = 586 \text{ g}$$

55. (A)

Let the mixture of O^{17} and O^{18} has at wt =M

$$\frac{90 \times 16 + M \times 10}{100} = 16.12 \quad M = 17.2$$

$((\%O^{17} \text{ x } 17) + (100 - \%O^{17} \text{ x } 18)) / 100 - 17.2$

$\%O^{17}$ is 80

In scale of 10 ans is 8%

56. (C)

PV = nRT

$$\text{or, } 1 \times \frac{168}{1000} = \frac{0.36}{3M} \times 0.0821 \times 273 \Rightarrow M = 16$$

57. (D)

$$H_2SO_4 = \frac{24.5}{98} \text{mole} = 0.25$$

$$SO_3 = \frac{20}{80} \text{mole} = 0.25$$

$Fe_2O_3 = \frac{40}{160}\text{mole} = 0.25$

58. (D)

No. of mole = 2 x 0.56/0.0821x546 =0.025

Molecular wt. = 1.1/0.025 = 44

59. (A)

Mole of NH_3/mole of O_2 =5/10

Atom ratio= $\frac{5x4}{10x2}$ = 1:1

60. (D)

One gm molecules of CO_2 is 6.023×10^{23} time heavier than one molecule of CO_2.

MATHEMATICS

61. (B)

For $x \in R$, $x^2 \geq 0$, $|x + 8| \geq 0$

$\therefore \quad x^2 + |x + 8| + 1 > 0 \; \forall \; x \in R$

62. (C)

$$\left(\frac{a}{b}\right)^x = c \quad \Rightarrow \quad x = \log_{\left(\frac{a}{b}\right)} c = \frac{\log c}{\log\left(\frac{a}{b}\right)} = \frac{\log c}{\log a - \log b}$$

63. (A)

$$\log_{\sqrt{2}} 16 = \log_{(2)^{1/2}} (2)^4 = \frac{4}{1/2}\log_2 2 = (4 \times 2) \times 1 = 8$$

64. (D)

Let $\log_{2\sqrt{3}} 1728 = x$

$\Rightarrow (2\sqrt{3})^x = 1728 \quad \Rightarrow \quad (2\sqrt{3})^x = (2^6 \times 3^3) = (2 \cdot \sqrt{3})^6$

$\therefore \quad x = 6$

65. (B)

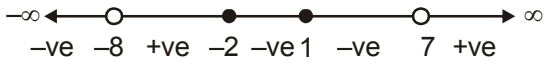
$\log_{10}5 = \log_{10}\left(\frac{10}{2}\right) = \log_{10}10 - \log_{10}2 = 1 - 0.3010 = 0.6990.$

66. (C)

$x^2 - 2x - 3 < 0 \quad \Rightarrow \quad (x - 3)(x + 1) < 0 \quad \Rightarrow \quad -1 < x < 3$

67. (B)

Using wavy curve method :



$\therefore \quad x \in (-\infty, 8) \cup [-2, 1] \cup (1, 7)$

i.e., $x \in (-\infty, 8) \cup [-2, 7)$

68. (A)

$||x-8|-13| \le 5 \Rightarrow -5 \le |x-8|-13 \le 5 \Rightarrow 8 \le |x-8| \le 18$

(i) $|x-8| \ge 8$

$\Rightarrow x-8 \le -8$ or $x-8 \ge 8$

$\Rightarrow x \le 0$ or $x \ge 16$

$x \in (-\infty, 0] \cup [16, \infty)$

and

(ii) $|x-8| \le 18$

$\Rightarrow -18 \le x-8 \le 18 \Rightarrow -10 \le x \le 26$

From (i) and (ii)

$x \in [-10, 0] \cup [16, 26]$

69. (C)

$x^2 - x < 0 \Rightarrow x(x-1) < 0 \Rightarrow 0 < x < 1$

70. (B)

Common value of A & B $x \in [-10,5) \cup (151,200]$ in this interval integers are (–10, –9, ...3, 4) & (152, 153,.....200) $\Rightarrow$ total integers = 64

71. (A)

$A = \{1,2,3,5,7\}$

$B = \{1,3,5,7,9,11,13\}$

$A - B = \{2\}, \; B - A = \{9,11,13\}$

$\therefore \quad (A-B) \cup (B-A) = \{2,9,11,13\} \Rightarrow$ Total 4 elements

72. (C)

$-2 < x < 0$ or $0 < x < \frac{1}{2}$

$\Rightarrow -\infty < \frac{2}{x} < -1$ or $4 < \frac{2}{x} < \infty \Rightarrow R - [-1, 4]$

73. (D)

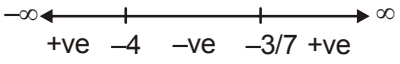
$A = \{-12,-11,....,12\} \Rightarrow n(A) = 25$

$B = \{1,2,3,.....,11\} \Rightarrow n(B) = 11$

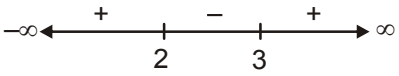
$|n(B) - n(A)| = 14$

74. (D)

$\frac{x-1}{x+4} + \frac{2}{5} > 0 \quad \Rightarrow \quad \frac{7x+3}{5(x+4)} > 0$



75. (A)



We have, $\frac{x-1}{x-2} > 2$

$\Rightarrow \frac{x-1}{x-2} - 2 > 0 \Rightarrow \frac{x-1-2x+4}{x-2} > 0 \Rightarrow \frac{-x+3}{x-2} > 0 \quad \Rightarrow \frac{x-3}{x-2} < 0$

$\Rightarrow \quad 2 < x < 3 \quad \Rightarrow \quad x \in (2, 3)$

76. (D)

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

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

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

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

77. (B)

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

In this case, we have

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

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

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

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

In this case, we have

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

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

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

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

78. (D)

We have, $x^2 + 9 < (x + 3)^2 < 8x + 25$

$\Rightarrow x^2 + 9 < x^2 + 6x + 9 < 8x + 25$

$\Rightarrow x^2 + 9 < x^2 + 6x + 9$ and $x^2 + 6x + 9 < 8x + 25$

$\Rightarrow 6x > 0$ and $x^2 - 2x - 16 < 0$

$\Rightarrow x > 0$ and $1 - \sqrt{17} < x < 1 + \sqrt{17}$

$\Rightarrow 0 < x < 1 + \sqrt{17} \Rightarrow x = 1, 2, 3, 4, 5.$

79. (B)

We have, $\log_3 y = x$ and $\log_2 z = x \Rightarrow y = 3^x$ and $z = 2^x$

$\therefore \quad 72^x = (2^3 \times 3^2)^x = (2^x)^3 (3^x)^2 = (z)^3 (y)^2 = y^2 z^3.$

80. (D)

We have, $\frac{\log_{10} a}{2} = \frac{\log_{10} b}{3} = \frac{\log_{10} c}{5} = \lambda (\text{say})$

$\Rightarrow \log_{10} a = 2\lambda, \log_{10} b = 3\lambda, \log_{10} c = 5\lambda$

$\Rightarrow a = 10^{2\lambda}, b = 10^{3\lambda}, c = 10^{5\lambda} \Rightarrow bc = 10^{8\lambda} = (10^{2\lambda})^4 = a^4$

81. (C)

Case I $x < 1$

$-x + 1 - x + 2 - x + 3 \geq 6$

$-3x + 6 \geq 6$

$-3x \geq 0$

$x \leq 0 \qquad (-\infty, 0]$

Case II $1 \leq x < 2$

$x - 1 - x + 2 - x + 3 \geq 6$

$-x + 4 \geq 6 \Rightarrow -x \geq 2 \Rightarrow x \leq -2 \therefore$ no solution

Case III

$2 \le x < 3$

$(x-1)+(x-2)-x+3 \ge 6$

$x \ge 6$ $\therefore$ no solution

Case IV

$x \ge 3$

$x-1+x-2+x-3 \ge 6$

$3x \ge 12$

$x \ge 4$

so $x \in (-\infty, 0] \cup [4, \infty)$

82. (A)

$\sec\theta - \tan\theta = \lambda \quad \Rightarrow \sec\theta + \tan\theta = \frac{1}{\lambda}$

$\therefore$ subtracting, $2\tan\theta = \frac{1}{\lambda} - \lambda$ or $2\left(a - \frac{1}{4a}\right) = \frac{1}{\lambda} - \lambda$

or $2a - \frac{1}{2a} = \frac{1}{\lambda} - \lambda \quad \Rightarrow \lambda = \frac{1}{2a}, -2a$

83. (B)

84. (C)

$\log_{0.04}(x-1) \ge \log_{0.2}(x-1)$ ...(i)

For log to be defined $x - 1 > 0 \Rightarrow x > 1$

From (i), $\log_{(0.2)^2}(x-1) \ge \log_{0.2}(x-1)$

$\Rightarrow \frac{1}{2}\log_{0.2}(x-1) \ge \log_{0.2}(x-1) \Rightarrow \sqrt{x-1} \le (x-1)$

$\Rightarrow \sqrt{x-1}(1-\sqrt{x-1}) \le 0 \Rightarrow 1-\sqrt{x-1} \le 0$

$\Rightarrow \sqrt{x-1} \ge 1 \Rightarrow x \ge 2, \therefore x \in [2, \infty).$

85. (B)

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

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

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

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

Hence (b) is the correct answer.

86. (A)

From $\sin x + \sin^2 x = 1$, we get $\sin x = \cos^2 x$, Now, the given expression is equal to

$\cos^6 x (\cos^6 x + 3\cos^4 x + 3\cos^2 x + 1) - 1 = \cos^6 x (\cos^2 x + 1)^3 - 1$

$= \sin^3 x (\sin x + 1)^3 - 1 = (\sin^2 x + \sin x)^3 - 1 = 1 - 1 = 0$

Hence (a) is the correct answer.

87. (A)

88. (A)

89. (A)

We have,

$\sin\theta + \text{cosec}\theta = 2$

$\Rightarrow \quad \sin^2\theta - 2\sin\theta + 1 = 0 \quad \Rightarrow \sin\theta = 1$

$\therefore \quad \sin^{10}\theta + \text{cosec}^{10}\theta = 1 + 1 = 2$

90. (D)

Case:- $|x - 1| = 1$ & $x > 0$

Ans :- $x = 2$

Case :- $|x - 1| \neq 0$

$x \neq 1$ then $\log_3 x^2 - 2\log_x 9 = 7$ or $2\log_3 x - 4\frac{1}{\log_3 x} - 7 = 0$

$\log_3 x = -1/2, 4$

$x = 3^{-1/2}, 3^4$ or 2