SOLUTIONS

WEEKLY TEST-3

GZPS-1901 & 1902

(JEE MAIN PATTERN)

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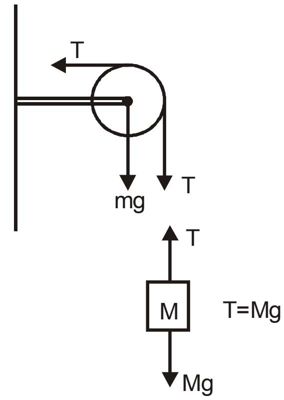
PHYSICS

1. (D)

Force on the pulley by the clamp,

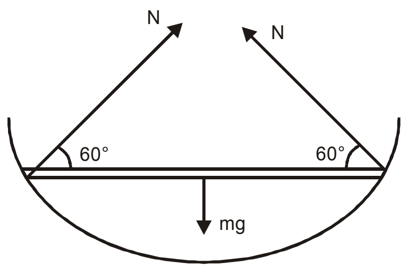


$$F = \sqrt{T^2 + (T + mg)^2}$$

$$= \sqrt{M^2 g + (Mg + mg)^2}$$

$$= \left(\sqrt{M^2 + (M+m)^2}\right) g$$

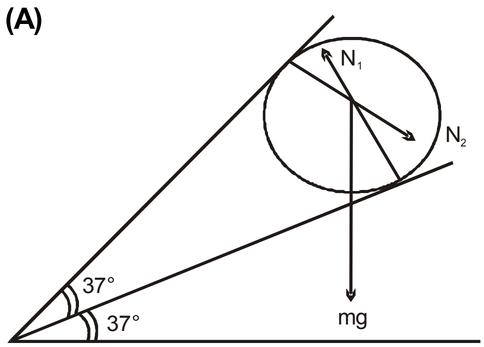
2. (D)

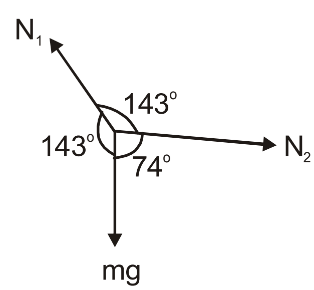


$$2N \sin 60° = mg$$

$$N = \frac{mg}{\sqrt{3}}$$

3. (A)



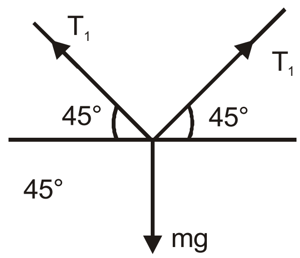


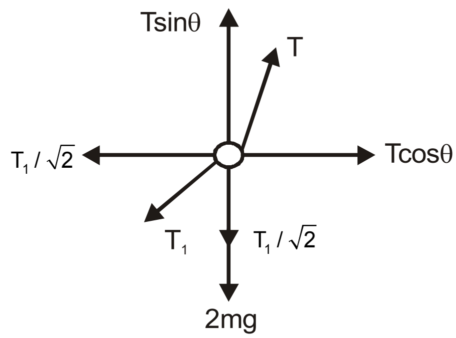
For equilibrium of ball

$$\frac{mg}{\sin 143°} = \frac{N_1}{\sin 74°} = \frac{N_2}{\sin 143°}$$

$\therefore$ $N_2 = mg$

4. (C)





$$\sqrt{2}\,T_1 = mg$$

$$T_1 = \frac{mg}{\sqrt{2}}$$

$$T\sin\theta = \frac{5}{2}mg$$

$$T\cos\theta = \frac{1}{2}mg$$

$$\tan\theta = 5$$

$$\theta = \tan^{-1}(5)$$

5. (A)

$$y = x + \frac{1}{x} + 2$$

on diff. w.r.t x

$$\frac{dy}{dx} = 1 - \frac{1}{x^2}$$

6. (A)

$$y = x\ln x$$

$$\frac{dy}{dx} = x\cdot\frac{1}{x} + \ln x$$

$= (1 + \ln x)$

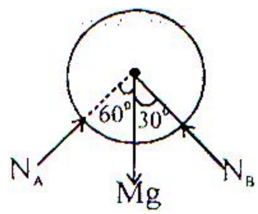
7. (A)

$$\int (x^2 - 1)dx = \frac{x^3}{3} - x + c$$

8. (A)

The FBD of the cylinder is as shown in figure,

As the cylinder is in equilibrium then net force acting on the block is zero.



For Horizontal equilibrium.

$N_A \sin 60 = N_B \sin 30°$ ....(i)

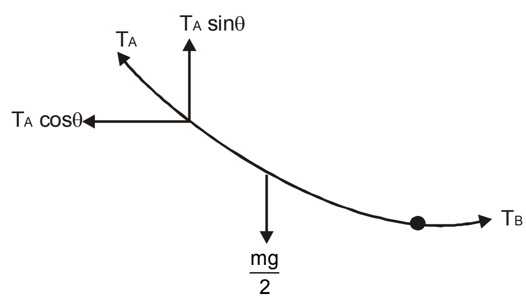
For vertical equilibrium, $N_A \cos 60 + N_B \cos 30° = Mg$ ....(ii)

solving abouve equation we get, $N_B = \sqrt{3}N_A$ & $N_A = \frac{Mg}{2}$

$$N_B = \frac{\sqrt{3}\,Mg}{2}$$

9. (B)

Cut the chain from its lowest point and draw the FBD of one half as shown. Let T' is the tension at end & T is tension of bottom–most point.



For vertical equilibrium

$$T_A \sin\theta = \frac{mg}{2}$$

For Horizontal equilibrium, $T_A \cos\theta = T_B$

$\Rightarrow T_B = \frac{mg\cot\theta}{2}$

10. (A)

$\vec{u} = \vec{a} - (\vec{a}\cdot\vec{b})\vec{b}$

$\vec{u}\cdot\vec{b} = \vec{a}\cdot\vec{b} - (\vec{a}\cdot\vec{b})|\vec{b}|^2 = 0$

$\vec{u} \perp \vec{b}$

$\vec{v} = \vec{a}\times\vec{b} = \vec{u}\times\vec{b}$

$|\vec{v}| = |\vec{u}|$

11. (B)

12. (B)

$\because \sin x + \cos x = \sqrt{2}$

on squaring $\Rightarrow \sin^2 x + \cos^2 x + 2\sin x\cos x = 2$

$\sin 2x = 1$ ....(1)

and $\frac{1}{\sin^6 x + \cos^6 x} = \frac{1}{1-3\sin^2 x\cos^2 x}$

$= \frac{1}{1-\frac{3}{4}\sin^2 2x} = \frac{1}{1-\frac{3}{4}(1)^2}$ using eq^n .... (1)

$= \frac{4}{4-3} = 4$

13. (C)

$y = \sqrt{3+x^2}$

$\frac{dy}{dx} = \frac{x}{\sqrt{3+x^2}}$

$\frac{d^2y}{dx^2} = \frac{\sqrt{(3+x^2)} - \frac{x^2}{\sqrt{3+x^2}}}{(3+x^2)}$

$= \frac{3+x^2-x^2}{(3+x^2)^{3/2}} = \frac{3}{(3+x^2)^{3/2}}$

$$\left(\frac{d^2y}{dx^2}\right) = \frac{3}{(3+6)^{3/2}} = \frac{3}{27}$$

$$\frac{1}{\frac{d^2y}{dx^2}} = 9$$

14. (A)

$$y = \frac{x^3}{3} - \frac{5}{2}x^2 + 6x + 4$$

$$\frac{dy}{dx} = x^2 - 5x + 6 \quad ....(1)$$

if $x^2 - 5x + 6 = 0$

$x = 2, 3$

Again diff. (1)

$$\frac{d^2y}{dx^2} = 2x - 5$$

at x= 2 $\frac{d^2y}{dx^2} = -1 < 0$

so maximum at x = 2.

15. (A)

$\int_1^2 ydx =$ area under the graph = $\frac{1}{2} \times 2 \times 1 = 1$

16. (D)

$$T_1 - 50 - 40 = 0$$

$$T_1 = 90\text{N}$$

17. (D)

$$\theta = \frac{\phi}{2}$$

18. (C)

19. (D)

$$2\sqrt{10+x^2} = \sqrt{20+(4x-2)^2}$$

$$40+4x^2 = 20+16x^2+4$$

$$12x^2-16x-16=0$$

$$x = \frac{4\pm\sqrt{16+48}}{6} = 2, \frac{-2}{3}$$

20. (D)

$$-\left[\frac{\cos 2x}{2}\right]_0^{\frac{\pi}{6}}$$

$$= \frac{1}{2}\left(\frac{1}{2}-1\right) = \frac{1}{4}$$

21. (B)

put $t = 1+x^2 \Rightarrow dt = 2xdx$

$$\frac{1}{2}\int\frac{dt}{t} = \frac{1}{2}\ell nt + C = \ell n\sqrt{1+x^2} + C$$

22. (C)

Remember $\vec{a}\times(\vec{b}\times\vec{c}) = \vec{b}(\vec{a}\cdot\vec{c}) - \vec{c}(\vec{a}\cdot\vec{b})$

Thisis called the vectro triple product.

Using above,

$$\hat{i}\times(\hat{i}\times\vec{a}) = \hat{i}(\hat{i}.\vec{a}) - \vec{a}(\hat{i}.\hat{i}) = \hat{i}(\hat{i}.\vec{a}) - \vec{a}$$

$$\hat{j}\times(\hat{j}\times\vec{a}) = \hat{j}(\hat{j}.\vec{a}) - \vec{a}(\hat{j}.\hat{j}) = \hat{j}(\hat{j}.\vec{a}) - \vec{a}$$

$$\hat{k}\times(\hat{k}\times\vec{a}) = \hat{k}(\hat{k}.\vec{a}) - \vec{a}(\hat{k}.\hat{k}) = \hat{k}(\hat{k}.\vec{a}) - \vec{a}$$

$$\therefore \quad \hat{i}\times(\hat{i}\times\vec{a}) + \hat{j}(\hat{j}\times\vec{a}) + \hat{k}\times(\hat{k}\times\vec{a})$$

$$= \hat{i}(\hat{i}.\vec{a}) + \hat{j}(\hat{j}.\vec{a}) + \hat{k}(\hat{k}.\vec{a}) - 3\vec{a} \qquad ...(i)$$

Since, $\vec{a} = \hat{i}\,a_x + \hat{j}\,a_y + \hat{k}\,a_z$

and $a_x = \hat{i}\,.\,\vec{a}; a_y = \hat{j}\,.\,\vec{a}; a_z = \hat{k}.\vec{a}$

$\therefore \quad \hat{i}\left(\hat{i}\times\vec{a}\right)+\hat{j}\left(\hat{j}\,.\,\vec{a}\right)+\hat{k}\left(\hat{k}\,.\,\vec{a}\right)=\hat{i}a_x+\hat{j}a_y+\hat{k}a_z=\vec{a}$

on putting in eq. (i) we get

$$\hat{i}\times\left(\hat{i}\times\vec{a}\right)+\hat{j}\times\left(\hat{j}\times\vec{a}\right)+\hat{k}\times\left(\hat{k}\times\vec{a}\right)=\vec{a}-3\vec{a}=-2\vec{a}$$

23. (A)

$\vec{s}=75\hat{j}+30\sqrt{2}\hat{j}-30\sqrt{2}\,\hat{i}+20\,\hat{i}$

distance,

$$s=\sqrt{\left(75+30\sqrt{2}\right)^2+\left(20-30\sqrt{2}\right)^2}$$

$$=\sqrt{75^2+30^2\times2+2\times75\times30\sqrt{2}+20^2+30^2\times2-2\times20\times30\sqrt{2}}$$

$$=\sqrt{5625+1800+400+1800+2\times30\sqrt{2}\times55}$$

$$=\sqrt{9625+4620}$$

$$=\sqrt{14245}$$

$$=120\,\text{km}$$

24. (A)

$R^2=P^2+Q^2+2PQ\cos\theta$

$$\left(P\sqrt{10}\right)^2=\left(2P\right)^2+\left(\sqrt{2}P\right)^2+2\times2P\times\sqrt{2}P\cos\theta$$

$$10P^2=4P^2+2P^2+4\sqrt{2}P^2\cos\theta$$

or $\quad 4\sqrt{2}\,P^2\cos\theta=4P^2$

$$\cos\theta=\frac{1}{\sqrt{2}}$$

$$\theta=45^\circ$$

25. (A)

$$\cos\theta=\frac{\vec{A}.\vec{B}}{AB}$$

$$= \frac{3\times6+4\times8+5\times10}{\sqrt{(3)^2+(4)^2+(5)^2}\times\sqrt{(6)^2+(8)^2+(10)^2}}$$

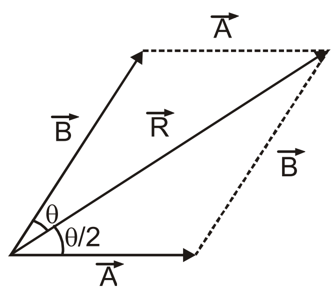
$$= \frac{100}{\sqrt{50}\times\sqrt{200}}$$

$$= \frac{100}{5\sqrt{2}\times10\sqrt{2}} = 1$$

$$\theta = \cos^{-1}\sqrt{1} = 0°$$

26. (C)

$$\tan\left(\frac{\theta}{2}\right) = \frac{B\sin\theta}{A+B\cos\theta}$$



or $$\frac{\sin\left(\frac{\theta}{2}\right)}{\cos\left(\frac{\theta}{2}\right)} = \frac{2B\sin\left(\frac{\theta}{2}\right)\cos\left(\frac{\theta}{2}\right)}{A+B\cos\theta}$$

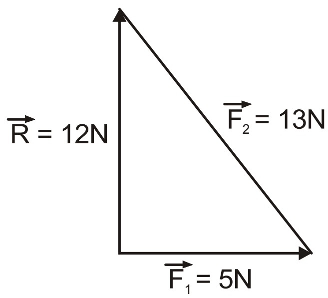
or $$A + B\cos\theta = 2B\cos^2\frac{\theta}{2}$$

or $$A + B\left(2\cos^2\frac{\theta}{2} - 1\right) = 2B\cos^2\frac{\theta}{2}$$

or A = B

27. (B)

In the vector diagram



$$\left|\vec{F}_1\right| + \left|\vec{F}_2\right| = 5 + 13 = 18N$$

and $\vec{R} \perp \vec{F}_1$

28. (B)

Work done $W = \vec{F} \cdot \vec{r}$

$$= \left(5\hat{i} + 3\hat{j} + 2\hat{k}\right) \cdot \left(2\hat{i} - \hat{j}\right) = 10 - 3$$

= 7 J

29. (A)

$\vec{A} \cdot \vec{B} = AB\cos\theta$

30. (D)

(i) $\left[(a\cos\theta)\,\hat{i} + (b\sin\theta)\,\hat{j}\right] \cdot \left[(b\sin\theta)\,\hat{i} - (a\cos\theta)\,\hat{j}\right]$

= $ab\sin\theta\cos\theta - ba\sin\theta\cos\theta = 0$

(ii) $\left[a(\cos\theta)\,\hat{i} + (b\sin\theta)\,\hat{j}\right] \cdot \left[\left(\frac{1}{a}\sin\theta\right)\hat{i} - \left(\frac{1}{b}\cos\theta\right)\hat{j}\right]$

= $\sin\theta\cos\theta - \sin\theta\cos\theta = 0$

(iii) $\left[(a\cos\theta)\,\hat{i} + (b\sin\theta)\,\hat{j}\right] \cdot 5\hat{k} = 0$

Hence, all the three options are correct because the dot product of two perpendicular vectors is zero.

CHEMISTRY

31. (C)

Moles of Mg = Moles of Al = 2

$\therefore$ Mass of Mg atoms = 2 x 24 g = 48 g

32. (B)

Moles of H_2O = 2 x moles of $BaCl_2 \cdot 2H_2O$ = $2 \times \frac{488}{244} = 4$

33. (B)

$\frac{d_A}{d_B} = 2$

$\Rightarrow \frac{V.D_A}{V.D_B} = 2$

$\therefore \frac{V.D_A}{20} = 2$

$\Rightarrow V.D_A = 40$

34. (D)

$\because$ 5 moles of O_2 require 4 moles of NH_3

$\therefore$ 6.8 g of NH_3 = $\frac{6.8}{17} = 0.4$ moles

35. (A)

Zn is the L.R.

$\therefore$ Mole of $ZnFeS_2$ formed = 2

36. (C)

$C_xH_y \rightarrow CO_2 + H_2O$

3.08 g 0.72 g

0.07 mole 0.04 mole

C : H = .07 : 2 x .04

= 7 : 8

Formula = C_7H_8

37. (C)

Relative density w.r.t oxygen = 2.22

Mol wt. = 32 × 2.22 = 71.04.

38. (C)

$$4PH_3 \longrightarrow P_4 + 6H_2$$

$$100\,ml \quad \frac{1}{4}\times 100 \; . \; \frac{6}{4}\times 100$$

$$25\,ml \qquad 150\,ml$$

Vol of gases (Product) = 175

Change in Volume = 175 – 100 = + 75 ml.

39. (C)

Let us 100 g Fe is taken.

Weight increase due to addition of oxygen.

$$4Fe + 3O_2 \longrightarrow 2Fe_2O_3$$

$$10\text{ g}$$

$$\frac{10}{32}\times \text{mole}$$

Mole of Fe reacted = $\frac{4}{3}\times\frac{10}{32} = \frac{10}{24}\text{mole}$

$$= \frac{10}{24}\times 56 = 23.33.$$

40. (A)

$H_2P_2O_7$ = 2 mole O atom = 7×2 = 14 mole

H_2O = 54 gm = 3 mole, O atom = 3 × 1 = 3 mole

H_2SO_4 = 98 gm = 1 mole O atom = 4 × 1 = 4 mole.

Total O atom = 21 mole

Mole of O_3 = 7 mole.

41. (A)

V.D. of $O_3 = \frac{48}{2} = 24$

V.D. of $CH_4 = \frac{16}{2} = 8$

Ratio $= \frac{24}{8} = 3.$

42. (A)

$$\underset{2.76}{Ag_2CO_3} \xrightarrow{\Delta} Ag_2O \xrightarrow{\Delta} \underset{(residue)}{2Ag} + \frac{1}{2}O_2$$

Ag_2O is thermally unstable and decomposes on heating liberating oxygen.

Mol. wt. of Ag_2CO_3 = 108 × 2 + 12 + 16 × 3 = 276 g

$\therefore$ 276 g of Ag_2CO_3 on heating gives residue = 2 × 108

= 216 g of Ag

$\therefore$ 2.76 of Ag_2CO_3 on heating gives $= \frac{216}{276} \times 2.76 = 2.16\,\text{g of Ag}$.

43. (D)

Two fix element should be taken and they must form multiple product.

44. (C)

45. (A)

46. (B)

47. (A)

In 100 ml of given coal gas contain H_2 = 50 ml, CH_4 = 30 ml, CO = 14 ml, C_2H_4 = 6 ml

$H_2(g) + \frac{1}{2}O_2(g) = H_2O(\ell)$

50 ml 25 ml 50 ml

$CH_4(g) + 2O_2(g) = CO_2(g) + 2H_2O(\ell)$

30 ml 60 ml 30 ml 60 ml

$CO(g) + \frac{1}{2}O_2(g) = CO_2(g)$

48. (A)

$3Mg + 2NH_3 \longrightarrow Mg_3N_2 + 3H_2$

mole $\frac{48}{24} = 2$ $\frac{34}{17} = 2$

$\therefore$ mass of $Mg_3N_2 = \frac{1}{3} \times 2 \times (3 \times 24 + 28) = \frac{200}{3}$

49. (C)

Let % mole of ^{26}Mg be X

$$\frac{(21 - X)25 + 26x + 79 \times 24}{100} = 24.31$$

X = 10 %

50. (C)

51. (D)

Mn_2O_7

mass of Mn = 55 × 2 = 110

Mass of O = 16 × 7 = 112

52. (D)

1 mg C_4H_{10} = $\frac{14N}{58}\times10^{-3}$ atoms

1mg N_2 = $\frac{2N\times10^{-3}}{28}$ atoms

1mg Na = $\frac{N\times10^{-3}}{23}$ atoms

1m H_2O = 1g H_2O = $\frac{3N}{18}$ atoms

53. (A)

Calculate M = $\frac{RTw}{PV}$

Wt. of one atom = M/(N × 2)

54. (B)

55. (D)

Mol wt of the polymer = 3 × 80 + 75 + 104 n = 315 + 104 n

$\therefore \frac{240}{(315+104n)} \times 100 = 10.46$

or 315 + 104 n = $\frac{240}{0.1046}$ = 2294.5

or n = 19

56. (D)

57. (A)

58. (A)

59. (C)

$2A + 3B \longrightarrow C + 2D$

Limiting reagent is 'B'

$n_A \text{left} = \frac{0.1}{3}, n_C = \frac{3.1}{3}, n_D = \frac{3.1}{3}\times 2 = \frac{6.2}{3}$

Total moles $=\frac{0.1}{3}+\frac{3.1}{3}+\frac{6.2}{3}=\frac{9.4}{3}$

Now, $\frac{V_{NTP}}{22.4}=\frac{9.4}{3}$ $\therefore$ $V_{NTP}=\frac{9.4}{3}\times 22.4=70.2L$

60. (D)

$\underset{0.4\,mol}{MnO_2}+\underset{0.5\,mol}{4HCl}\longrightarrow MnCl_2+Cl_2+2H_2O$; L.R is HCl.

$\therefore\ n_{Cl_2}=\frac{0.5}{4}=\frac{m}{M}=\frac{m}{71};m_{Cl_2}=\frac{71}{8}=8.875\,g\ \approx 8.9\ g$

MATHEMATICS

61. (C)

Put x = 1 – p in $x^2 + px + (1 - p) = 0$, then we get its root as x = 0, –1

62. (C)

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

63. (D)

If $x^2+4x+3=(x+3)\ (x+1)\geq 0, x\in R-(-3,-1)$ ....(1)

The given equation becomes $x^2+6x+8=0$

$\Rightarrow\ x=-2,-4$ ....(2)

From (1) and (2) $\Rightarrow\ x=-4$

If $x^2+4x+3<0, x\in(-3,-1)$ ....(3)

The equation becomes $-(x^2+4x+3)+2x+5=0$

or $x^2+2x-2=0\Rightarrow x=-1\pm\sqrt{3}$ ....(4)

From (3) and (4) $\Rightarrow\ x=-1-\sqrt{3}$

Sum of the roots = $-4+(-1-\sqrt{3})=-5-\sqrt{3}$.

64. (C)

According to property

$\log_2 x \ge \log_{2^{-1}}(x-1)$

$\Rightarrow \log_2 x \ge -\log_2(x-1) \Rightarrow \log_2 x(x-1) \ge 0$

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

$\Rightarrow \left(x - \frac{1-\sqrt{5}}{2}\right)\left(x - \frac{1+\sqrt{5}}{2}\right) \ge 0 \Rightarrow x \ge \frac{1+\sqrt{5}}{2} \text{ or } x \le \frac{1-\sqrt{5}}{2}$

$\left(\because \log_{1/2}(x-1) \text{ is defined only } x-1>0\right)$ and log x is defined when x > 0

combining above all we get common value is

$x \in \left[\frac{1+\sqrt{5}}{2}, \infty\right)$

65. (C)

From $\log_{100}|x+y| = \frac{1}{2}$, we get $|x+y| = 100^{1/2} = 10.$

From $\log_{10} y - \log_{10}|x| = \log_{100} 4 = \log_{10} 2,$ we have

$\frac{y}{|x|} = 2 \Rightarrow y^2 = 4x^2 \Rightarrow x^2 + y^2 + 2xy = 100$ or $5x^2 + 4x|x| = 100$

$\Rightarrow x = \frac{10}{3}$ for $x > 0 \Rightarrow y = \frac{20}{3}$

and $x = -10$ for $x < 0 \Rightarrow y = 20.$

66. (C)

$x^2 + 3x + 2 \ge 0 \Rightarrow (x+1)(x+2) \ge 0$

$\Rightarrow x \in (-\infty, -2] \cup [-1, \infty)$ I

Case I. $x - 1 < 0 \Rightarrow x < 1, x - 1 < \sqrt{x^2 + 3x + 2}$ is true

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

Case II. if $x - 1 \ge 0 \Rightarrow x \ge 1$

$x - 1 < \sqrt{x^2 + 3x + 2}$

$\Rightarrow\ x^2-2x+1<x^2+3x+2\ \Rightarrow\ 5x+1>0\ \Rightarrow\ x>-\dfrac{1}{5}$

$\therefore\ x\in[1,\infty)$ ... (ii)

From (i) and (ii)

$x\in(-\infty,-2]\cup[-1,\infty)$

67. (B)

We find the expression for the intervals $(-\infty,1),[1,2),[2,7),[7,\infty)$ respectively.

$$f(x)=\begin{cases}-4x+31, & x<1\\ 27, & 1\le x\le 2\\ -6x+39, & 2<x<7\\ 4x-31, & x\ge 7\end{cases}$$

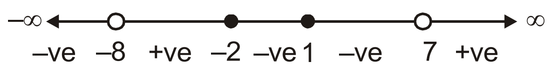
For $1\le x\le 2,\ f(x)=27$ (i.e. constant)

68. (C)

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

69. (B)

Using wavy curve method :



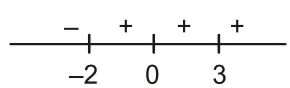
$\therefore\ x\in(-\infty,-8)\cup[-2,1]\cup(1,7)$

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

70. (D)

Using wavy curve method and the fact that x = 0 and 3 are the repeated roots of

$x(e^x-1)(x+2)(x-3)^2\le 0$ we get the sign scheme of the given expression as



Thus complete solution is $x\in(-\infty,-2]\cup\{0,3\}$

71. (D)

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

72. (A)

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

$2x^2-8\le 0$

$x^2 - 4 \le 0$

$x \in [-2, 2]$

73. (C)

$8 - |x| \ge 4 \quad \Rightarrow \; |x| - 4 \le 0 \quad \Rightarrow \; x \in [-4, 4]$

74. (B)

$x^2 - 3x \ge 0 \;\Rightarrow\; x \in (-\infty, 0] \cup [3, \infty)$

or

$x - 2 \ge 0$	$x - 2 < 0$
$\Rightarrow\; x \in [2, \infty)$	$\Rightarrow\; x \in (-\infty, 2)$
$x^2 - 3x \ge (x - 2)^2$	
$\Rightarrow\; x \in [4, \infty)$	

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

75. (D)

$1 \le |3 - x| < 2$

and

$\|3 - x\| \ge 1$	$\|3 - x\| < 2$
$\Rightarrow\; x \in (-\infty, 2] \cup [4, \infty)$	$\Rightarrow\; x \in (1, 5)$

Ans. $x \in (1, 2] \cup [4, 5)$

76. (B)

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

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

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

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

77. (C)

$|x - 1| - |x - 2| = \dfrac{1}{2}$

$x \le 1$	$1 \le x \le 2$	$x \ge 2$
$-(x-1) + (x-2) = \dfrac{1}{2}$	$(x-1) + (x-2) = \dfrac{1}{2}$	$(x-1) - (x-2) = \dfrac{1}{2}$
$-1 = \dfrac{1}{2}$	$x = \dfrac{7}{4}$	$1 = \dfrac{1}{2}$
x	✓	x

78. (B)

$3x^2 - 10x + 3 = 0 \quad \Rightarrow \quad x = 3, 1/3$

or, $|x - 4| = 1 \quad \Rightarrow \quad x = 5, 3.$

79. (B)

$|x - 2| - 1 = 0 \quad \Rightarrow \quad x = 1, 3 \quad$ (But $x \neq 1$)

$|x - 1| = 1 \quad \Rightarrow \quad x = 2, 0$

80. (C)

$$\frac{x-2}{1-2x} \geq 0 \quad \Rightarrow \quad \frac{x-2}{2x-1} \leq 0 \quad \Rightarrow \quad x \in \left(\frac{1}{2}, 2\right]$$

81. (A)

$x - 3 > 0 \quad \Rightarrow x > 3 \quad$ and $\quad x - 2 > 0 \quad \Rightarrow x > 2$

$\Rightarrow \; x > 3$

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. (B)

$B \cap (A \cup B) = B$

84. (C)

85. (A)

$(A')' = A$

$\therefore A \cap A = A$

86. (A)

Solve the inequations

$x^2 - 3x + 2 \leq 0$ and $\quad 2x^2 - 3x - 5 \geq 0$

$\Rightarrow \; 1 \leq x \leq 2 \quad$ and $\quad x \leq -1 \quad$ or $\; x \geq \frac{5}{2}$

$\therefore \; x \in \phi$

87. (B)

$\Rightarrow 2x - 3 \in [-4, -3) \cup (3, 4]$

$2x \in [-1, 0) \cup (6, 7]$

$x \in \left[-\frac{1}{2}, 0\right) \cup \left(3, \frac{7}{2}\right]$

88. (A)

$1 - 3x \geq 0$

$x \leq \frac{1}{3}$

And

$-x^2 + x + 6 \geq 0$

$x^2 - x - 6 \leq 0$

$x^2 - 3x + 2x - 6 \leq 0$

$(x-3)(x+2) \leq 0$

$x \in [-2, 3]$

The answer will be $\left[-2, \frac{1}{3}\right]$

89. (A)

$(A \cap B)' = A' \cup B'$

90. (D)

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

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

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

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

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