Section – I

1.(b) Resultant of $\vec{A}$ & $\vec{B}$ lies on a plane and $\vec{C}$ lies in another plane so resultant can never be zero.

2.(c) $P = \frac{W}{t}$

or, $t = \frac{W}{P} = \frac{mgh}{P}$

$= \frac{200 \times 10 \times 40}{10 \times 10^3} = 8$ sec

3.(b) When spring is cut in 4 equal parts then K' = 4K

$\frac{T'}{T} = \sqrt{\frac{K}{K'}} = \sqrt{\frac{K}{4K}} = \frac{1}{2}$

$\therefore$ $T' = \frac{T}{2}$

4.(a) On heating upthrust decreases so it sink.

5.(a) $\frac{E'}{E} = \left(\frac{546}{273}\right)^4 = 16$

$\therefore$ E' = 16E

6.(a) $\omega t = 40t$ $\quad$ $kx = x$

or, $\omega = 40$ $\quad$ $k = 1$

or, $f = \frac{40}{2\pi}$ $\quad$ $\frac{2\pi}{\lambda} = 1$

$\lambda = 2\pi$

$\therefore$ $v = f\lambda = \frac{40}{2\pi} \times 2\pi = 40$ m/s

$\therefore$ $v = \sqrt{\frac{T}{m}}$

or, $T = v^2m = 40^2 \times 10^{-2} = 16N$

7.(d) Distance = 30 + 10 + 10

= 50 cm

8.(c) Near point = –40 cm

u = 25 cm v = 40 cm

$f = \frac{uv}{u + v} = \frac{25(-40)}{25 - 40} = +\frac{200}{3}$ cm $= \frac{2}{3}$ m

$P = \frac{1}{f_{inm}} = \frac{3}{2} = +1.5D$

9.(a) $V = \frac{W}{Q} = \frac{4}{20} = 0.2$ V

10.(c) $I = \frac{E}{R + r} = \frac{50}{10 + r}$

or, $10 + r = \frac{50}{4.5} = 11.1$

$\therefore$ $r = 1.1\ \Omega$

11.(a) When current divide in circle magnetic field at centre is zero.

12.(d) $T = 2\pi\sqrt{\frac{I}{MH}}$

$I = \left(\frac{l^2 + b^2}{12}\right)$ m, M = 2ml

Independent of length of suspension.

13.(b) $\frac{1}{\lambda} = R\left[\frac{1}{2^2} - \frac{1}{3^2}\right]$ for Hydrogen

or, $\frac{C}{\lambda} = CR\left[\frac{5}{36}\right]$

or, $f_0 = \frac{5RC}{36}$

For Helium $\frac{1}{\lambda} = Z^2R\left[\frac{1}{2^2} - \frac{1}{3^2}\right]$

or, $\frac{C}{\lambda} = Z^2\ RC\left[\frac{5}{36}\right]$

or, $f' = 4RC \times \frac{5}{36} = 4f$

14.(b) Voltage gain $= \frac{V_{out}}{V_{in}} = \frac{I_c\ R_{out}}{I_b\ R_{in}}$

$= \beta \times \frac{24}{3}$

$= 0.6 \times 8 = 4.8$

15.(a) No. of protons = No. of mole × N_A × No. of protons in one molecule of $CaCO_3$

16.(b)

17.(b) $MHPO_4$ shows that valency of M = 2 (since HPO_4 has valency 2). Hence chloride will be MCl_2

18.(b)

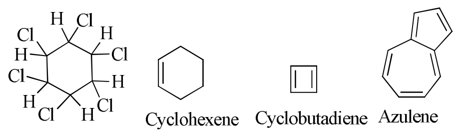
19.(d)

20.(a)

21.(d) F^- is the most electronegative element.

22.(c) The impurity in extraction of copper is FeO which is removed by adding SiO_2.

23.(d) It obeys Huckel's rule i.e. it contains (4n+2) delocalized π electrons e.g.10 π electrons.



BHC $\quad$ Cyclohexene $\quad$ Cyclobutadiene $\quad$ Azulene

24.(a) It is known as enyne compound. Its IUPAC format is: Alk-en-yne. Numbering is done by the lowest sum rule.

25.(d) Carbonium ion e.g. CH_3^+ (6 electrons)

Free radical e.g. $.CH_3$ (7 electrons)

Nitrene e.g. CH_3N (6 electrons)

Carbanion e.g. CH_3^- (8 electrons)

26.(d) $(CH_3)_3CNO_2$, CCl_3CHO and $(CH_3)_3CHO$ do not have α hydrogen atoms so they do not show tautomerism.

27.(a) +R or +M groups viz. –OH, OR, $–NH_2$, –X etc give ortho and para substituted product due to mesomeric effect or resonating effect.

28.(c)

29.(c) We have $p \Rightarrow q \equiv (\sim q) \Rightarrow (\sim p)$

So the equivalent statement must be if mobile works well then battery is not low.

30.(b) $A - (A - B) = A\cap(A - B)' = A\cap(A\cap B')' = A\cap(A'\cup(B')') = A\cap(A'\cup B)$

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

31.(c) One root $= -2 + \sqrt{3}$

As the irrational roots always occur in conjugate pair. So other root must be $-2 - \sqrt{3}$.

32.(d) For equal roots, we must have, discriminant = 0

$\Rightarrow \quad (k + 2)^2 - 4 \times 1.2k = 0$

$\Rightarrow \quad k^2 + 4k + 4 - 8k = 0$

$\Rightarrow \quad k^2 - 4k + 4 = 0$

$\Rightarrow \quad (k - 2)^2 = 0$

$\Rightarrow \quad k = 2$

33.(a) Here lines are parallel and have no point of intersection.

34.(c) Here the lines x = 0 and y = 0 are perpendicular to each other. Hence the orthocentre = (0, 0)

35.(b) Given $x^2 + y^2 = 0$ which is true only when

$x^2 = 0, y^2 = 0$ i.e., x = 0, y = 0. So a point

36.(c) Using fact that, product of parameters = –1 at the end of focal chord.

37.(d) Given parabola is $y^2 = 2x$

Here $a = \frac{1}{2}$

and the line is $y = 2x + \lambda$.

So $m = 2$, $c = \lambda$

The line touches the parabola if

$\lambda = am = \frac{1}{2} \times 2 = 1$

38.(a) Distance from y-axis $= \sqrt{x^2 + z^2} = \sqrt{16 + 25} = \sqrt{41}$ units.

39.(c) $\sqrt{6^2 + (-2)^2 + 3^2} = \sqrt{36 + 4 + 9} = \sqrt{49} = 7$

So the direction cosines of a normal are

$\frac{6}{7}, -\frac{2}{7}, \frac{3}{7}$

40.(d) Given $|\vec{a}| = 1$, $|\vec{b}| = 1$, $|\vec{a} + \vec{b}| = 1$, angle between $\vec{a}$ & $\vec{b} = \alpha$

Now, $|\vec{a} + \vec{b}|^2 = 1$

or, $|\vec{a}|^2 + |\vec{b}|^2 + 2\vec{a}.\vec{b} = 1$

or, $1 + 1 + 2|\vec{a}|\,|\vec{b}| \cos\alpha = 1$

or, $2.1.1 \cos\alpha = -1$

or, $\cos\alpha = -\frac{1}{2}$ $\qquad \therefore \alpha = 120°$

41.(c) $\sec^{-1}x = \operatorname{cosec}^{-1}y$

or, $\cos^{-1}\frac{1}{x} = \sin^{-1}\frac{1}{y}$

or, $\cos^{-1}\frac{1}{x} = \frac{\pi}{2} - \cos^{-1}\frac{1}{y}$

$\therefore \quad \cos^{-1}\frac{1}{x} + \cos^{-1}\frac{1}{y} = \frac{\pi}{2}$

42.(d) $P(A\cup B) = P(A) + P(B) - P(A\cap B)$

$= 0.4 + 0.5 - 0.12 = 0.78$

$P(\overline{A\cup B}) = 1 - P(A\cup B) = 1 - 0.78 = 0.22$

$P(\overline{B}) = 1 - P(B) = 1 - 0.5 = 0.5$

$\therefore \quad P(\overline{A}/\overline{B}) = \frac{P(\overline{A}\cap\overline{B})}{P(\overline{B})} = \frac{P(\overline{A\cup B})}{P(\overline{B})} = \frac{0.22}{0.5} = 0.44$

43.(b) Given $\sigma_x = 20$ $\quad \sigma_y = 15$ $\quad r = 0.48$

$\therefore$ Regression coefficient of x on y $b_{xy} = r\frac{\sigma_x}{\sigma_y}$

$= 0.48 \times \frac{20}{15} = 0.64$

44.(c) Given $\lim_{x \to 0} \frac{\tan 2x - x}{3x - \sin x} = \lim_{x \to 0} \frac{\frac{\tan 2x}{2x} \times 2 - 1}{3 - \frac{\sin x}{3}}$

$= \frac{2 - 1}{3 - 1} = \frac{1}{2}$

45.(c) Since the function is continuous at x = 0.

So we have $\lim_{x \to 0} f(x) = f(0)$

or, $\lim_{x \to 0} x\sin\frac{1}{x} = k$ $\qquad \therefore k = 0$

46.(d) Given $y = x + \frac{x^2}{2} + \frac{x^3}{3} + \ldots$ to ∞

or, $y = -\left(-x - \frac{x^2}{2} - \frac{x^3}{3} - \ldots \text{ to } \infty\right)$

or, $y = -\ln(1 - x)$

$\therefore \quad \frac{dy}{dx} = -\frac{1}{1 - x} - 1 = \frac{1}{1 - x}$

47.(b) Given $f(x) = \tan^{-1}x$

So $f'(x) = \frac{1}{1 + x^2} > 0$ for all real x

$\therefore$ The function is strictly increasing.

48.(a) Given ysinx = x + c

On differentiation, $y\frac{d\sin x}{dx} + \sin x\frac{dy}{dx} = \frac{dx}{dx} + \frac{dc}{dx}$

or, $\sin x\frac{dy}{dx} + y\cos x = 1$

or, $\frac{dy}{dx} + y\cot x = \operatorname{cosec} x$

On comparing with $\frac{dy}{dx} + Py = Q$ we get

Q = cosec x

49.(a)	**50.(a)**	**51.(d)**	**52.(d)**	**53.(a)**	**54.(c)**
55.(b)	**56.(d)**	**57.(b)**	**58.(c)**	**59.(b)**	**60.(a)**

Section – II

61.(c) $\frac{h}{2} = \frac{g}{2}(2n - 1)$

or, $\frac{1}{2} \times \frac{1}{2}gn^2 = \frac{g}{2}(2n - 1)$

or, $n^2 - 4n + 2 = 0$

or, n = 3.42 sec

$\therefore$ $h = \frac{1}{2}g(3.42)^2$

$= \frac{1}{2} \times 10\ (3.42)^2$

= 58 m

62.(c) $\frac{Gm_1}{x^2} = \frac{Gm_2}{(1-x)^2} \Rightarrow x = \frac{1}{11}$ m

63.(b) Energy stored = K.E. of mass

$\frac{1}{2}\frac{YAe^2}{ml} = \frac{1}{2}mv^2$

$v = \sqrt{\frac{YAe^2}{ml}} = \sqrt{\frac{5 \times 10^8 \times 10^{-6} \times 0.02^2}{5 \times 10^{-3} \times 0.1}} = 20$ m/s

64.(b) $E = \sigma AT^4 \times t = 4.45$ kJ

65.(a) $(\mu - 1)t = n\lambda$, $\lambda = \frac{(\mu - 1)t}{n} = \frac{(1.5 - 1) \times 6 \times 10^{-6}}{5}$

$= 6 \times 10^{-7}$ m = 6000 Å

66.(b) $f_0 = \frac{1}{2L}\sqrt{\frac{\text{stress}}{\rho}} = \frac{1}{2l}\sqrt{\frac{Y \times \text{strain}}{\rho}} = 170$ Hz

67.(c) $F = 9\times10^9 . \frac{Q_1Q_2}{r^2} \Rightarrow r^2 = 9 \times 10^9\frac{Q_1Q_2}{F} = 9$cm

68.(b) Amount of heat energy required for the water to boil
Q = 1 (100 - 20) × 4200 + 420×80 = 369600J

Q = 90% of Pt, t = 467 sec

69.(d) $E = \frac{1}{2}mv^2$

$v = \sqrt{\frac{2E}{m}} = \sqrt{\frac{2 \times 2 \times 10^6 \times 1.6 \times 10^{-19}}{1.67 \times 10^{-27}}}$

$= 1.96 \times 10^7$ m/s

$F = Bev = 2.5 \times 1.6 \times 10^{-19} \times 1.96 \times 10^7$

$= 7.84 \times 10^{-12}$ N

70.(c) $L = \frac{N\phi}{I} = 2.5\times10^{-3}$ H

The magnetic energy stored, $U = \frac{1}{2}LI^2 = 5 \times 10^{-3}$ J

71.(d) $\phi_0 = \frac{hc}{\lambda} - \text{K.E.} = 3 \times 10^{-19}$

$f_0 = \frac{3\times10^{-19}}{h} = 4.5\times10^{14}$ Hz

72.(d) For 1st member of Balmer series $\frac{1}{\lambda_{B'}} = R\left(\frac{1}{4} - \frac{1}{9}\right)$

$\Rightarrow$ $\lambda_B = \frac{36}{5R}$

For second member of same series,

$\frac{1}{\lambda_{B'}} = R\left(\frac{1}{4} - \frac{1}{16}\right) \Rightarrow \lambda_B' = \frac{16}{3R}$ ……(i)

i.e. $\frac{\lambda_{B'}}{\lambda_B} = \frac{16 \times 5R}{3R \times 36}$

$\therefore$ $\lambda_B' = \frac{20}{27} \times 6563 = 4861$Å

73.(b) $\frac{N'}{N_0}$

So, $\frac{N}{N_0} = 1 - \frac{N'}{N_0} = 1 - \frac{1}{4} = \frac{3}{4}$

$\frac{N}{N_0} = \left(\frac{1}{2}\right)^{\frac{t}{T_{1/2}}}$

or, $\frac{3}{4} = \left(\frac{1}{2}\right)^{\frac{t}{T_{1/2}}}$

or, $\frac{ln\left(\frac{3}{4}\right)}{ln\left(\frac{1}{2}\right)} = \frac{t}{T_{1/2}}$

or, t = 224 yrs

74.(c) New concentration of

$HCl = \frac{10^{-6}}{100} = 10^{-8}M$

$\therefore$ $[H^+] = 10^{-8} + 10^{-7} = 1.1 \times 10^7$m

$\therefore$ pH ≈ 6.95

75.(d) Find solubility by $4s^3$ = Ksp for Ag_2S and s^2 = Ksp for CuS and HgS

76.(d) $AgNO_3 \rightarrow Ag^+ + NO_3^-$

100 ml 0.1N 100 ml 0.1 N

100 ml 0.1 N = 200 ml N_2

N_2 = 0.05 N with respect to NO_3^- ion.

77.(c) 9 gram element $\rightarrow$ 8 gm O_2

So, eq. wt. of element is 9

At. wt. = E × v = 9 × 3 = 27

78.(a) Reaction whose rate is not affected by concentration or in which the concentration of the reactant do not change with time is called zero order reaction.

79.(a)

80.(c) $CH\equiv CH + HOCl \rightarrow CH(OH)_2-CHCl_2 \xrightarrow{H_2O} CHOCHCl_2$

81.(a) The order of reactivity of alkyl halides towards elimination reaction follows the order: 3° > 2° > 1°.

82.(d) $n(U) = 140, n(A) = 75, n(B) = 85$

Here maximum possible value of $n(A\cup B) = 140$

Minimum possible value of $n(A\cup B) = 85$

So, $n(A'\cap B') = n(A\cup B)' = n(U) - n(A\cup B)$

i.e., $n(A'\cap B') = 140 - n(A\cup B)$

$\therefore$ Maximum value of $n(A'\cap B') = 140 - 85 = 55$

83.(a) Let a, b be two numbers. Then

$a_1A_1A_2$, b are in A.P. So $A_1 - a = A_1 - A_2$

i.e., $A_1 + A_2 = a + b$

a_1, G_1, G_2, b are in G.P. So $\frac{G_1}{a} = \frac{b}{G_2} \Rightarrow G_1G_2 = ab$

and a_1, H_1, H_2 b are in HP. So $\frac{1}{a}, \frac{1}{H_1}, \frac{1}{H_2}, \frac{1}{b}$ are in A.P.

Then, $\frac{1}{H_1} - \frac{1}{a} = \frac{1}{b} - \frac{1}{H_2} \Rightarrow \frac{1}{H_1} + \frac{1}{H_2} = \frac{1}{a} + \frac{1}{b} = \frac{a+b}{ab}$

or, $\frac{H_1 + H_2}{H_1H_2} = \frac{a+b}{ab} = \frac{A_1 + A_2}{G_1G_2}$

$\therefore \frac{G_1G_2}{H_1H_2} = \frac{A_1 + A_2}{H_1 + H_2}$

84.(a) $\left(\frac{1+i}{1-i}\right)^x = 1$

or, $\left(\frac{1+i}{1-i} \times \frac{1+i}{1+i}\right)^x = 1$

or, $\left(\frac{1^2 + 2i + i^2}{1^2 - i^2}\right)^x = 1$

or, $\left(\frac{1 + 2i - 1}{1 + 1}\right)^x = 1$

or, $\left(\frac{2i}{2}\right)^x = 1$

or, $i^x = 1$

$\therefore$ $x = 4n, n\in Z^+$

as $i^2 = -1$

85.(c) Given equation is

$x^2 - |x| - 6 = 0$

When x > 0, the equation is $x^2 - x - 6 = 0$

i.e. $x = -2, 3$

$\Rightarrow$ $x = 3$

When x < 0 the equation, is $x^2 + x - 6 = 0$

i.e. $x = -3, 2 \Rightarrow x = -3$

$\therefore$ Product of real roots = 3 × –3 = –9

86.(c) Here, number of diagonals = 44

or, $\frac{n(n-3)}{2} = 44$

or, $n^2 - 3n = 88$

or, $n^2 - 3n - 88 = 0$

or, $n^2 - 11n + 8n - 88 = 0$

or, $n(n - 11) + 8(n - 11) = 0$

or, $(n - 11)(n + 8) = 0$

$\therefore$ n = 11 or

n = –8 (not possible)

87.(a) We have $(1 + x)^n = C_0 + C_1x + C_2x^2 + ... + C_nx^n$

or, $x(1 + x)^n = C_0x + C_1x^2 + C_2x^3 + ... + C_nx^{n+1}$

Differentiating,

$nx(1 + x)^{n-1} + (1 + x)^n = C_0 + 2C_1x + 3C_2x^2 + ... + (n + 1)C_nx^n$

Putting x = 1, we have

$n2^{n-1} + 2^n = C_0 + 2C_1 + 3C_2 + ... + (n + 1)C_n$

$\therefore$ $(n + 2)\, 2^{n-1} = C_0 + 2C_1 + 3C_2 + ... + (n + 1)C_n$

88.(c) Given equation $ax^2 + 2hxy + by^2 = 0$

Here, $m_1 + m_2 = -\frac{2h}{b}, m_1m_2 = \frac{a}{b}$

Suppose, $m_1 = m, m_2 = 2m$

Then, $m + 2m = -\frac{2h}{b}, m.2m = \frac{a}{b}$

or, $3m = -\frac{2h}{b}$ $\quad 2m^2 = \frac{a}{b}$

or, $m = -\frac{2h}{3b}$ $\quad 2 \times \left(-\frac{2h}{3b}\right)^2 = \frac{a}{b}$

or, $2.\frac{4h^2}{9b^2} = \frac{a}{b}$ $\quad \therefore 8h^2 = 9ab$

89.(c) Given line is $y = mx + c$ and parabola is $x^2 = 4ay$

Solving, $x^2 = 4a(mx + c)$

$x^2 = 4amx + 4ac$

or, $x^2 - 4amx - 4ac = 0$

The line will touch if discriminant = 0

$(-4am)^2 - 4 \times 1 \times -4ac = 0$

or, $16a^2m^2 + 16ac = 0 \Rightarrow c = -am^2$

90.(d) Given $|\vec{a}| = 3, |\vec{b}| = 4, |\vec{c}| = 5$ and $\vec{a} + \vec{b} + \vec{c} = 0$

Now, $(\vec{a} + \vec{b} + \vec{c})^2 = |\vec{a}|^2 + |\vec{b}|^2 + |\vec{c}|^2 + 2(\vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{c}.\vec{a})$

$0 = 3^2 + 4^2 + 5^2 + 2(\vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{c}.\vec{a})$

or, $0 = 9 + 16 + 25 + 2(\vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{c}.\vec{a})$

or, $-50 = 2(\vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{c}.\vec{a})$

$\therefore$ $\vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{c}.\vec{a} = -25$

91.(b) $\sin^{-1}x + \sin^{-1}y = \frac{2\pi}{3}$ or, $\frac{\pi}{2} - \cos^{-1}x + \frac{\pi}{2} - \cos^{-1}y = \frac{2\pi}{3}$

i.e., $\cos^{-1}x + \cos^{-1}y = \frac{\pi}{3}$ ... (i)

and $\cos^{-1}x - \cos^{-1}y = \frac{\pi}{3}$ ... (ii)

Adding (i) and (ii),

$2\cos^{-1}x = \frac{2\pi}{3} \Rightarrow \cos^{-1}x = \frac{\pi}{3} \Rightarrow x = \cos\frac{\pi}{3} = \frac{1}{2}$

From (i), $\frac{\pi}{3} + \cos^{-1}y = \frac{\pi}{3} \Rightarrow \cos^{-1}y = 0 \Rightarrow y = 1$

92.(c) Given $\tan^{-1}\left(\frac{1+x}{1-x}\right) = \tan^{-1}\left(\frac{1+x}{1-1.x}\right) = \tan^{-1}(1) + \tan^{-1}x = \frac{\pi}{4} + \tan^{-1}x$

So, $\frac{d}{dx}\tan^{-1}\left(\frac{1+x}{1-x}\right) = \frac{d\,\pi/4}{dx} + \frac{d\tan^{-1}x}{dx} = \frac{1}{1+x^2}$

93.(c) Let x and y be two numbers whose sum is 4.

Then $x + y = 4$

i.e. $y = 4 - x$

Let $S = \frac{1}{x} + \frac{1}{y} = \frac{x+y}{xy} = \frac{4}{x(4-x)} = \frac{4}{4x - x^2}$

Let $z = \frac{4x - x^2}{4}$

Then $\frac{dz}{dx} = \frac{4 - 2x}{4}, \frac{d^2z}{dx^2} = -\frac{1}{2}$

For maxima or minima, $\frac{dz}{dx} = 0 \Rightarrow \frac{4-2x}{4} = 0$

$\Rightarrow x = 2$

and $\frac{d^2z}{dx^2} = -\frac{1}{2} < 0$

$\therefore$ z is maximum and hence S is minimum.

So minimum value of $S = \frac{4}{4 \times 2 - 2^2} = \frac{4}{8-4} = \frac{4}{4} = 1$

94.(a) Put $x = \tan\theta$ i.e. $dx = \sec^2\theta\, d\theta$

Then, $I = \int e^\theta \left(\frac{1 + \tan\theta + \tan^2\theta}{1 + \tan^2\theta}\right) \sec^2\theta\, d\theta$

$= \int e^\theta \left(\frac{\tan\theta + \sec^2\theta}{\sec^2\theta}\right) \sec^2\theta\, d\theta$

$= \int e^\theta (\tan\theta + \sec^2\theta)\, d\theta$

$= e^\theta \tan\theta + c$

$= e^{\tan^{-1}x}\, x + c$

95.(b) Here $f(x) = x^2|x|$, $f(-x) = (-x)^2\,|-x| = x^2|x| = f(x)$

So, $\int_{-1}^{1} x^2|x|\, dx$

$= 2\int_0^1 x^2|x|\, dx = 2\int_0^1 x^2\, x dx = 2\int_0^1 x^3 dx$

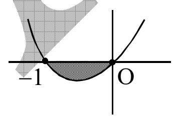
$= 2\left[\frac{x^4}{4}\right]_0^1 = 2 \times \left(\frac{1}{4} - 0\right) = \frac{1}{2}$

96.(c) Given, $\frac{dy}{dx} = 2x + 1$

On integration,

$\int dy = \int (2x + 1)\, dx$

$y = x^2 + x + c$



But it passes through (1, 2).

So, $2 = 1^2 + 1 + c$

i.e. $c = 0$

So the curve is $y = x^2 + x$

Along x-axis, $y = 0$

$x^2 + x = 0$

i.e. $x = 0, -1$

$\therefore$ Required area

$= \int_0^{-1} y\, dx = \int_0^{-1} (x^2 + x)\, dx = \left[\frac{x^3}{3} + \frac{x^2}{2}\right]_0^{-1}$

$= \frac{(-1)^3}{3} + \frac{(-1)^2}{2} = -\frac{1}{3} + \frac{1}{2} = \frac{-2+3}{6} = \frac{1}{6}$ sq. units

97.(c) **98.(b)** **99.(c)** **100.(d)**

…The End…