Section I – Quantitative Aptitude – 40 qs (Time – 40 min)

1. If in a rectangle the ratio of the length and the breadth is equal to the ratio of the sum of the length and breadth to the length, where *l* and *b* are the length and breadth of the rectangle, then find which of the following is true?

I. $\frac{l}{b} = \frac{l^2}{b^2} + 1$ II. $\frac{b}{l-b} = \frac{l+b}{l}$ III. $lb = (l + b)(l - b)$

a) Only I is true
b) Only II is true
c) II and III are true
d) I and II are true
e) Cannot be determined

1. Since $\frac{l}{b} = \frac{(l+b)}{l}$

$\Rightarrow$ $l^2 = b(l + b) = lb + b^2$

$\Rightarrow$ $l^2 - b^2 = lb$ … (i)

$\Rightarrow$ $(l + b)(l - b) = lb$ … (ii)

and $\frac{(l+b)}{l} = \frac{b}{(l-b)}$ … (iii)

Therefore, Statement II and III are true from equations (ii) and (iii), respectively

$\frac{l^2}{b^2} = \frac{bl + b^2}{b^2}$

$\Rightarrow$ $\frac{l^2}{b^2} = 1 + \frac{l}{b}$

$\Rightarrow$ $\frac{l}{b} = \frac{l^2}{b^2} - 1$

Hence, Statement I is not true.
Hence option (c) is the answer.

2. What is the value of, $[\ln \frac{e}{\sqrt[3]{2}} + \ln \sqrt[3]{\frac{2}{e}}\ ]$

a) 1/3 b) ¼ c) 1/2 **d) 4/3**

2. (d) $\ln \frac{e}{\sqrt[3]{2}} + \ln \sqrt[3]{\frac{2}{e}}$

= 1 – 1/3 * ln2 + 1/3 * ln2 + 1/3 = 4/3

3. If f(x) = 2x – 3 and g (x) = $\frac{x+3}{2}$, find $f(g(f(g(f(g(x))))))$

a) x b) $\frac{x+3}{2}$ c) 2x – 3 d) 3

3. (a) $f\left(g\left(f\left(g\left(f\left(\frac{x+3}{2}\right)\right)\right)\right)\right)$ = y (Suppose)

$\Rightarrow$ y = f(g(f(g(x))))

= $f\left(g\left(f\left(\frac{x+3}{2}\right)\right)\right)$ = $f(g(x))$ = $f\left(\frac{x+3}{2}\right)$ = x

4. If $P = \begin{bmatrix} \frac{\sqrt{3}}{2} & \frac{1}{2} \\ -\frac{1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix}$ and $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and $Q = PAP^T$ and $x = P^T Q^{2005} P$ then x is equal to

a) $\begin{bmatrix} 1 & 2005 \\ 0 & 1 \end{bmatrix}$

b) $\begin{bmatrix} 4+2005\sqrt{3} & 6015 \\ 2005 & 4-2005\sqrt{3} \end{bmatrix}$

c) $\frac{1}{4}\begin{bmatrix} 2+\sqrt{3} & 1 \\ -1 & 2-\sqrt{3} \end{bmatrix}$

d) $\frac{1}{4}\begin{bmatrix} 2005 & 2-\sqrt{3} \\ 2+\sqrt{3} & 2005 \end{bmatrix}$

4. (a). Given that, $P = \begin{bmatrix} \frac{\sqrt{3}}{2} & \frac{1}{2} \\ -\frac{1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix}$

$A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and $Q = PAP^T$ and $x = P^T Q^{2005} P$

We observe that $Q = PAP^T$

$\Rightarrow Q^2 = \left(PAP^T\right)\left(PAP^T\right)$

$= PA\,(P^T P)\,A\,P^T = PA\,(IA)\,P^T$

$\therefore P\,A^2\,P^T$

Proceeding in the same way, we get

$Q^{2005} = PA^{2005}\,P^T$

Also $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} \Rightarrow A^2 = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$

and proceeding in the same way

$A^{2005} = \begin{bmatrix} 1 & 2005 \\ 0 & 1 \end{bmatrix}$

Now, $X = P^I\,Q^{2005}\,P$

$= P^T\,(PA^{2005}\,P^T)P = (P^T P)\,A^{2005}\,(P^T P)$

$= IA^{2005}\,I = A^{2005} = \begin{bmatrix} 1 & 2005 \\ 0 & 1 \end{bmatrix}$

Alternate Solution

Here we observe that

$|P| = |P^T|$

$= \begin{bmatrix} \sqrt{3}/2 & 1/2 \\ -1/2 & \sqrt{3}/2 \end{bmatrix} = \frac{3}{4}+\frac{1}{4} = 1 \quad (\because |A| = |A^T|)$

and $|A| = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} = 1$

$\therefore |Q| = \left|PAP^T\right|$

$= |P|\,|A|\,|P^T|\ (\because |AB| = |A|\,|B|)$

$= 1.1.1 = 1$

$\therefore |Q^{2005}| = |Q|^{2005}$

$\therefore |x| = |P^T\,Q^{2005}\,P|$

$= |P^T|\,|Q|^{2005}\,|P| = 1$

and $|x| = 1$ only in the case of option (a).

5. If a number is x is increased by 10%, then what would be the increase % of x^2?

a) 20% **b) 21%** c) 100% d) 10%

5. (b) x^2 increase % is = $\left[10+10+\frac{10\times10}{100}\right]\% = 21\%$

6. Find the maximum and the minimum values of the function $\frac{x^2-x+1}{x^2+x+1}$ for real values of *x*?

a) 3 and –3 b) $\frac{1}{3}$ and $-\frac{1}{3}$ **c) 3 and $\frac{1}{3}$** d) 1 and –3 e) 1 and –1

6. $\frac{x^2-x+1}{x^2+x+1} = m$; $x^2(m-1) + x(m+1) + (m-1) = 0$;

9y × EK, the $(m+1)^2 - 4(m-1)^2 \geq 0$

Or, $[(m+1) + 2(m-1)][m+1) - 2(m-1)] \geq 0$;

or $(3m-1)(m-3) \leq 0$; or $\frac{1}{3} \leq m \leq 3$

So max value is 3 and min value is 1/3. Hence, option (c).

7. The triangle formed by the tangent to the curve $f(x) = x^2 + bx - b$ at the point (1, 1) and the coordinate axes, lies in the first quadrant. If its area is 2, then the value of b is

a) -1 b) 3 **c) -3** d) 1

7. (c). Tangent to $y = x^2 + bx - b$ at (1, 1) is

$y - 1 = (2 + b)(x - 1)$

$\Rightarrow (b+2)x - y = b + 1$

x-intercept = $\frac{b+1}{b+2}$ and y-intercept = $-(b+1)$

Given Ar(Δ) = 2

$\Rightarrow \frac{1}{2}\left(\frac{b+1}{b+2}\right)[-(b+1)] = 2$

$\Rightarrow b^2 + 2b + 1 = -4(b+2) \Rightarrow b^2 + 6b + 9 = 0$

$\Rightarrow (b+3)^2 = 0 \Rightarrow b = -3$

8. The ratio of the sum to *n*-terms of two different *AP*'s are $4n - 1 : 3n + 4$, then the ratio of the 19^{th} terms of these *AP*'s will be

a) 75 : 61 b) 143 : 115 **c) 147 : 115** d) None of these

8. Let a_1, a_2 and d_1, d_2 be the 1^{st} terms and common difference of the two AP's respectively.

$$\frac{\frac{n}{2}\left(2a_1+(n-1)d_1\right)}{\frac{n}{2}\left(2a_2+(n-1)d_2\right)} = \frac{4n-1}{3n+4} \qquad \frac{\left(a_1+\frac{(n-1)}{2}d_1\right)}{\left(a_2+\frac{(n-1)}{2}d_2\right)} = \frac{4n-1}{3n+4}$$

Ratio of 19^{th} term = $\frac{\left(a_1+(19-1)d_1\right)}{\left(a_2+(19-1)d_2\right)}$ So, $\frac{n-1}{2} = 18$

n = 37

the ratio is $\frac{4(37)-1}{3(37)+4} \Rightarrow \frac{147}{115}$ So, Hence, option (c).

9. If $A = \sin^2 x + \cos^4 x$, then for all real x :

a) $\frac{13}{16} \leq A \leq 1$ b) $1 \leq A \leq 2$ c) $\frac{3}{4} \leq A \leq \frac{13}{16}$ d) $\frac{3}{4} \leq A \leq 1$

9. $A = \sin^2 x + \cos^4 x$

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

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

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

Now $0 \le \sin^2(2x) \le 1$

$\Rightarrow 0 \ge -\frac{1}{4}\sin^2(2x) \ge -\frac{1}{4}$

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

10. The centre of the circle passing through the point (0, 1) and touching the curve $y = x^2$ at (2, 4) is

a) $\left(\frac{-16}{5}, \frac{27}{10}\right)$ b) $\left(\frac{-16}{7}, \frac{53}{10}\right)$ c) $\left(\frac{-16}{5}, \frac{53}{10}\right)$ d) None of these

10. Key Concept: Equation of tangent at a point (x_1, y_1) of a curve can be obtained by replacing x^2 by xx_1, y^2 by yy_1, x by

$\frac{1}{2}(x + x_1)$ and y by $\frac{1}{2}(y + y_1)$.

If the circle touches $y = x^2$ at (2, 4) then the tangent at (2, 4) to $y = x^2$ will be same as tangent to circle at [(2, 4)] which is

$\frac{1}{2}(y + 4) = 2x.$

or $4x - y = 4$ ……..(1)

let eq. of circle be

$x^2 + y^2 + 2gx + 2fx + c = 0$

with centre (-g, -f)

As it passes through (0, 1)

$\Rightarrow 1 + 2f + c = 0$

$\therefore c = -1 - 2f$ …….(2)

Also the eq. of tangent of circle at (2, 4) is

$x.\ 2 + y\ .\ 4 + g(x + 2) + f(y + 4) + c = 0$

Using eq. (2) it becomes

$(2 + g)\ x + (4 + f)\ y + 2g + 2f - 1 = 0$ ……..(3)

But (1) and (3) represents the same line

$\therefore \frac{2+g}{4} = \frac{4+f}{-1} = \frac{2g+2f-1}{-4}$

$\Rightarrow -2 - g = 16 + 4f$ and $2 + g = -2g - 2f + 1$

$\Rightarrow g + 4f + 18 = 0$ ……..(1)

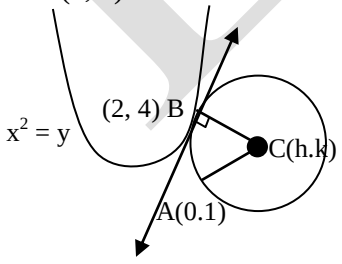
$3g + 2f + 1 = 0$

Solving we get g = 16/5, f = -53/10

$\therefore$ Centre (-16/5, 53/10).

Alternate solution

Let C (h, k) be the centre of circle touching $x^2 = y$ at B (2, 4). Then equation of common tangent at B is



Note this step

$2.x = \frac{1}{2}(y + 4)$ i.e., $4x - y = 4$

Radius is perpendicular to this tangent

$\therefore\ 4\left(\frac{k-4}{h-2}\right) = -1 \Rightarrow 4k = 18$ …….(1)

Also AC = BC

$\Rightarrow h^2 + (k-1)^2 = (h-2)^2 + (k-4)^2$

$\Rightarrow 4h + 6k = 19$ ……..(2)

Solving (1) and (2)

We get the centre as $\left(-\frac{16}{5}, \frac{53}{10}\right)$.

11. If $A = \begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$ and $|A^3| = 125$ then the value of α is

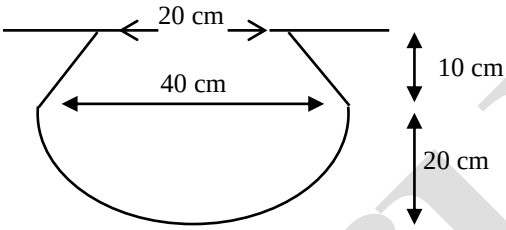
a) ± 1 b) ± 2 **c) ± 3** d) ± 5

11. (c). $A = \begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$ and $|A^3| = 125 \Rightarrow |A|^3 = 125$

Now, $|A| = \alpha^2 - 4$

$\Rightarrow (\alpha^2 - 4)^3 = 125 = 5^3 \Rightarrow \alpha^2 - 4 = 5 \Rightarrow \alpha = \pm 3$

12. A cooking pot has a spherical bottom, while the upper part is a truncated cone. Its vertical cross section is shown in the figure. If the volume of food increases by 15% during cooking, the maximum initial volume of food that can be cooked without spilling (in *cc*) is



a) $\frac{19550\pi}{3}$ b) 10000π **c)** $\frac{20000\pi}{3}$ d) 20000π e) $\frac{10000\pi}{3}$

12. The volume = $\frac{2}{3}\pi(20)^3 + \frac{1}{3}\pi \times 10[700] = \frac{\pi}{3}[16000 + 7000] = \frac{23000\pi}{3}$

$\therefore$ Required volume = $\frac{23000\pi}{3} \times \frac{100}{115} = \frac{20000\pi}{3}$. [option – c]

13. Three people A, B and C weight themselves in a particular order. First A, B, C weight themselves individually and then AB, BC, CA and ABC together respectively. The recorded weight for the last measure is 180 kgs. The average of the 7 measures is:

a) 320 kgs b) $\frac{360}{7}$ kgs **c)** $\frac{720}{7}$ **kgs** d) Cannot be determined

13. The order of measure is A, B, C, A + B, B + C, C + A, A + B + C.

Given A + B + C = 180

Hence, average of the 7 measures =

$$\left[\frac{[(A)+(B)+(C)+(A+B)+(B+C)+(C+A)+(A+B+C)]}{7}\right]$$

$= \frac{4}{7}(A+B+C) = \frac{4}{7} \times 180 = \frac{720}{7}$ kgs.

Hence, [3].

14. P is a rational number. Q is an integer. P × Q is:

I. Always rational

II. Integer when P is a natural number

III. Natural number when P is an integer

a) Only I is true **b) I and II are true** c) II and III are true

d) I, II and III are true e) I and III are true

14. P × Q is always rational and integer only when P is an integer.

15. Events A, B, C are mutually exclusive events such that $P(A) = \frac{3x+1}{3}$, $P(B) = \frac{1-x}{4}$ and $P(C) = \frac{1-2x}{2}$. The set of possible values of x are the interval

a) [0, 1] **b)** $\left[\frac{1}{3}, \frac{1}{2}\right]$ c) $\left[\frac{1}{3}, \frac{2}{3}\right]$ d) $\left[\frac{1}{3}, \frac{13}{3}\right]$

15. $P(A) = \frac{3x+1}{3}$, $P(B) = \frac{1-x}{4}$, $P(C) = \frac{1-2x}{2}$

$\because$ For any event E, $0 \le P(E) \le 1$

$\Rightarrow 0 \le \frac{3x+1}{3} \le 1$, $0 \le \frac{1-x}{4} \le 1$ and $0 \le \frac{1-2x}{2} \le 1$

$\Rightarrow -1 \le 3x \le 2$, $-3 \le x \le 1$ and $-1 \le 2x \le 1$

$\Rightarrow -\frac{1}{3} \le x \le \frac{2}{3} \le -3 \le x \le 1$, and $-\frac{1}{2} \le x \le \frac{1}{2}$

Also for mutually exclusive events A, B, C, $P(A \cup B \cup C) = P(A) + P(B) + P(C)$

$\Rightarrow P(A \cup B \cup C) = \frac{3x+1}{3} + \frac{1-x}{4} + \frac{1-2x}{2}$

$\therefore 0 \le \frac{1+3x}{3} + \frac{1-x}{4} + \frac{1-2x}{2} \le 1$

$0 \le 13 - 3x \le 12 \Rightarrow 1 \le 3x \le 13 \Rightarrow \frac{1}{3} \le x \le \frac{13}{3}$

Considering all inequations, we get

$\max\left\{-\frac{1}{3}, -3, -\frac{1}{2}, \frac{1}{3}\right\} \le x \le \min\left\{\frac{2}{3}, 1, \frac{1}{2}, \frac{13}{3}\right\}$

$\frac{1}{3} \le x \le \frac{1}{2} \Rightarrow x \in \left[\frac{1}{3}, \frac{1}{2}\right]$

16. At a telephone enquiry system the number of phone calls regarding relevant enquiry follow Poisson distribution with an average of 5 phone calls during 10 minute time intervals. The probability that there is at the most one phone call during a 10 minute time period is

a) $\frac{6}{5^e}$ b) $\frac{5}{6}$ c) $\frac{6}{55}$ **d)** $\frac{6}{e^5}$

16. (d). $P(X = r) = \frac{e^{-m} m^r}{r!}$

P(at most 1 phone call)

$= P(X \le 1) = P(X = 0) + P(X = 1)$

$= e^{-5} + 5 \times e^{-5} = \frac{6}{e^5}$

17. What is the value of the constants A and B that make the equation true?

$(2x-9)/(x^2- x- 6) = A/(x-3) + B/(x+2)$

a) A=-3/5, B=13/5 b) A=3/5, B=8/5 c) A=-1/3, B=13/8 d) A=-3/5, B=18/5

17. (d) $\frac{2x-9}{x^2-x-6} = \frac{A}{x-3}+\frac{B}{x+2} = \frac{(A+B)x+2A-3B}{x^2-x-6}$

$\therefore$ A + B = 2 and 2A – 3B = - 9

$\Rightarrow$ A = (2 - B) $\Rightarrow$ 4 – 2B – 3B = - 9

$\Rightarrow$ 5B = + 13

$\therefore$ B = 13/5

$\therefore$ A = $2-\frac{13}{5} = -\frac{3}{5}$

18. Find max $(2 + x)^3(2 – x)^4$ for $| x | < 2$.

a) $3^3\times4^{11}\times7^{-7}$ b) $3^7\times4^4\times7^{-11}$ c) $3\times4^7\times7^{-7}$ d) $3^4\times4^5\times7^{-12}$

18. $(2 + x)^3 (2 – x)^4$ is maximum for

$\frac{2+x}{3} = \frac{2-x}{4}$

or, 8 + 4x = 6 – 3x

or, 7x = –2 i.e. x = $\frac{-2}{7}$

$\therefore$ Maximum value = $\left(2-\frac{2}{7}\right)^3\left(2+\frac{2}{7}\right)^4 = \left(\frac{12}{7}\right)^3.\left(\frac{16}{7}\right)^4 = 3^3 . 4^{11}. 7^{-7}$. Hence, option (a).

19. The expression $4x^2 – x – 2$ has minimum value for

a) $x = \frac{1}{8}$ b) $x = -\frac{1}{3}$ c) $x \le -\frac{1}{3}$ d) $x \ge \frac{1}{3}$

19. $f(x) = 4x^2 – x – 2 = (2x)^2 – 2 \times (2x) \times \frac{1}{4} + \frac{1}{16} - \frac{1}{16} - 2 = (2x – \frac{1}{4})^2 - \frac{33}{16}$

$(2x – \frac{1}{4})^2 \ge 0$

$\therefore$ Minimum value of the expression occurs at $2x = \frac{1}{4}$

$\therefore$ $x = \frac{1}{8}$

Hence, option (a).

20. What is the product of $x + 1 + \frac{1}{x}$, $x + \frac{1}{x} - 1$, $x^2 – 1 + \frac{1}{x^2}$ and $x^4 - 1 + \frac{1}{x^4}$?

a) $x^8 - \frac{1}{x^8} + 1$ b) $\frac{x^8+x^4}{x^8}$ c) $x^8 - \frac{1}{x^8} - 1$ **d)** $x^8 + \frac{1}{x^8} + 1$

20. $\left(x+1+\frac{1}{x}\right)\left(x+\frac{1}{x}-1\right)\left(x^2-1+\frac{1}{x^2}\right)\left(x^4-1+\frac{1}{x^4}\right)$

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

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

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

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

$= \left(x^4+\frac{1}{x^4}+1\right)\left(x^4+\frac{1}{x^4}-1\right)$

$= \left(x^4+\frac{1}{x^4}\right)^2 - 1 = x^8+\frac{1}{x^8}+1$. Hence, (4).

21. Two sides of a triangle are of length 4 cm and 10 cm. if length of the third side is 'a' cm then

a) $a > 5$ b) $6 \le a \le 12$ c) $a < 6$ **d) $6 < a < 14$**

21. (c) $1 = 1 * r * 8/100$
$\Rightarrow r = 12.5\%$

22. Let $f(x) = 3f(x-1) - 2$ for $x = 1, 2, 3, \ldots$
$f(0) = 0$
Then $f(50) = ?$

a) $1 - 3^{49}$ b) $1 + 3^{49}$ **c) $1 - 3^{50}$** d) None of these

22. $f(x) = 3f(x-1) - 2$ for $x = 1, 2, 3, \ldots$
$f(0) = 0$
$f(1) = 3f(0) - 2 = -2 = 1 - 3^1$
$f(2) = 3f(1) - 2 = 3(-2) - 2 = -8 = 1 - 3^2$
$f(3) = 3f(2) - 2 = 3(-8) - 2 = -26 = 1 - 3^3$
…….
…….
$f(50) = 1 - 3^{50}$ Hence, option (c)

23. The locus of a variable point whose distance from (-2, 0) is 2/3 times its distance from the line $x = -\frac{9}{2}$ is

a) ellipse b) parabola c) hyperbola d) None of these

23. (a). If variable point is P and S (-2, 0) then $PS = \frac{2}{3}$ OM where PM is the perpendicular distance of point P from given line x = -9/2

$\therefore$ By definition P describes an ellipse. $\left(e = \frac{2}{3} < 1\right)$

Alternate Solution:

Let the variable point be P (x, y) and let S (-2, 0). Let M be the first of the perpendicular from P to the line $x = -\frac{9}{2}$.

Now,

$SP = \sqrt{(x+2)^2+(y-0)^2} = \sqrt{x^2+y^2+4x+4}$

$PM = \frac{2x+9}{\sqrt{2^2}} = \frac{2x+9}{2}$ $\left(\because x = -\frac{9}{2} \Rightarrow 2x + 9 = 0\right)$

According to the question,

$SP = \frac{2}{3} PM \Rightarrow 9SP^2 = 4PM^2$

$\Rightarrow 9x^2 + 9y^2 + 36x + 36 = 4x^2 + 36x + 81$

$\Rightarrow 5x^2 + 9y^2 = 45 \Rightarrow \frac{x^2}{9} + \frac{y^2}{5} = 1$

Which is the equation of an ellipse.

24. If $\sin^4x + \sin^2x = 1$ then $\cot^4x + \cot^2x =$

a) 0 b) –1 **c) 1** d) 2 e) ½

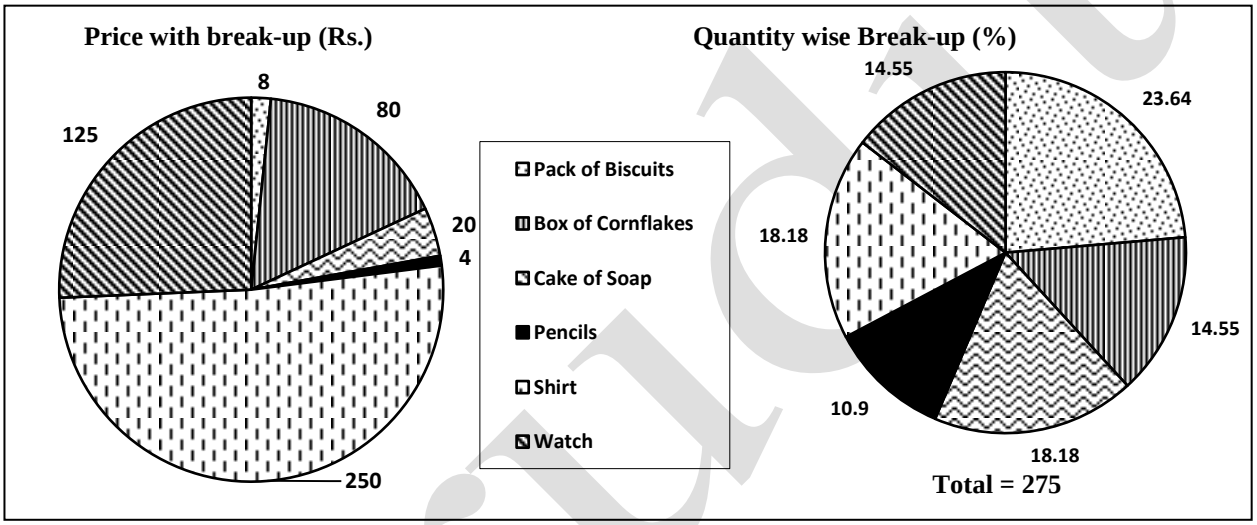
24. $\sin^4x = \cos^2x$

$$\therefore \cot^2x\,(\cot^2x + 1) = \cot^2 x\left[\frac{1}{\sin^2 x}\right] = \frac{\cos^2 x}{\sin^4 x} = 1$$

Directions for questions 57 to 60: Refer to the passage given below and answer the following questions

Pantaloons puts up a year end sale to clear stock in which it decides to offer some items free with others. The combined price of the free gifts should not be more than 10% of the price of the item bought. Given this constraint, the value of free gifts should be maximized per item bought.
Food items should be moved first.

The pie chart below gives the data about the items' price and their quantities on which Pantaloons giving offer.



All the quantities (nos.) and the prices of items are whole number.

25. How many combinations of free gifts can be given with a shirt? (Medium)
a) 3 **b) 5** c) 4 d) 6

26. How many combinations of free gifts can be given with a watch? (Easy)
a) 3 **b) 2** c) 5 d) 4

27. If biscuits can be offered only with cornflakes or watches, how much of the latter two items will be left after all the biscuit packets are given as gifts? (Medium)
a) 25 cornflakes **b) 25 watches** c) 25 shirts d) both 2 & 3

28. If one soap and one pencil is offered with each shirt, how many units of each items are left? (Easy)
a) 10 Pencils b) 10 pencils, 10 watches
c) 20 soaps, 10 shirts d) none left

25. The value of free gifts should not exceed Rs 25. The combinations are 1 soap + 1 pencil, 3 packs of biscuits, 2 packs of biscuits + 2 pencils, 1 pack of biscuit + 4 pencils, 6 pencils. Hence option (b).

26. The value of the free gifts should not exceed Rs 12.50.
The combinations are 1 biscuits + 1 pencil, 3 pencils. ∴ (b)

27. Following the rules of maximizing of free gifts moving food items first, offer biscuit with cornflakes. This leaves 25 packs of biscuits. Now, for every watch we can give 1 biscuit packet + 1 pencil. Hence 25 biscuit packets will be given when 25 watches are sold. So 25 watches will be left. Hence option (b).

28. When each of the three items are grouped, the smallest number is the determining factor. There are 30 pencils and the offer can be made only on 30 out of the total 50 shirts. Even though there are 50 soaps. ∴(c).

29. Find the real x domain of the function $y = \frac{2}{\sqrt{x^2 - 5x}}$

a) $0 < x < 5$ **b) $x < 0, x > 5$** c) $0 \le x \le 5$ d) $x \le 0, x \ge 5$

29. For the function y to be defined, the expression under square root sign in the denominator should be positive.
$\Rightarrow x^2 - 5x > 0$
$\Rightarrow x(x - 5) > 0$
Solving the quadratic inequality, we get, $x < 0$ or $x > 5$.
$\Rightarrow x \in (-\infty, 0)$ or $(5, \infty)$

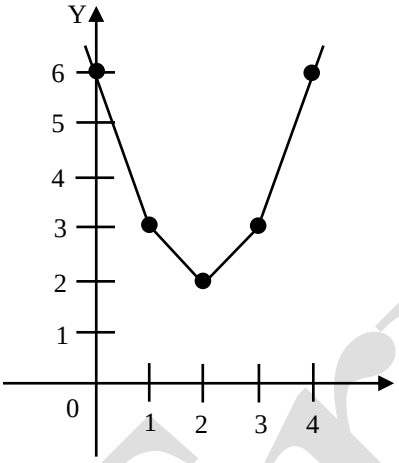
30. If x satisfies $| x - 1| + |x - 2| + |x - 3| \ge 6$, then

a) $0 \le x \le 4$ b) $x \le -2$ or $x \ge 4$ c) $x \le 0$ or $x \ge 4$ d) None of these

30. (c). $| x - 1| + |x - 2| + |x - 3| \ge 6$
Consider $f(x) = |x - 1| + |x - 2| + |x - 3|$

$$f(x) = \begin{cases} 6 - 3x, & x < 1 \\ 4 - x, & 1 \le x < 2 \\ x, & 2 \le x < 3 \\ 3x - 6, & x \ge 3 \end{cases}$$

Note this step:



Graph of f(x) shows $f(x) \ge 6$ for $x \le 0$ or $x \ge 4$.

31. Solve for x: $2 + \log \sqrt{1 + x} + 3 \log \sqrt{1 - x} = \log \sqrt{1 - x^2}$

a) 100 b) 1/100 **c) 99/100** d) 99

31. (c) $2 + \log\sqrt{(1 + x)} + 3\log\sqrt{(1 - x)} = \log\sqrt{(1 - x^2)}$
$\Rightarrow 2\log\sqrt{(1 - x)} = -2$
$\Rightarrow 10^{-2} = 1 - x$
$\therefore x = 1 - 1/100 = 99/100$

32. Set A has the set of real number $-10 \le n \le 10$. If two numbers x, y are picked at random from the set, find the probability that $|x| \le 5$; $|y| \le 5$ and $x + y \le 5$

a) $\frac{7}{32}$ b) $\frac{1}{4}$ c) $\frac{1}{5}$ d) Data insufficiente) None of these

32. Area of $|x| \le 5$; $|y| \le 5$ and $x+y = \le 5 = 87.5$
Total area = 400
$\therefore \text{Probability} = \frac{87.5}{400} = \frac{7}{32}$

33. The mean and the variance of a binomial distribution are 4 and 2 respectively. Then the probability of 2 successes is

a) $\frac{28}{256}$ b) $\frac{219}{256}$ c) $\frac{128}{256}$ d) $\frac{37}{256}$

33. (a). mean = np = 4 and variance = npq = 2

$\therefore$ p = q = $\frac{1}{2}$ and n = 8

$\therefore$ P(2 success) = $^8C_2\left(\frac{1}{2}\right)^6\left(\frac{1}{2}\right)^2 = \frac{28}{2^8} = \frac{28}{256}$

34. Solve for x : $\log_2(x + 1) + \log_2(3x - 5) = \log_2(5x - 3) + 2$

a) (7, 1/3) b) (10, -1/2) c) (11, 1/2) d) (9, 1/3)

34. (a)$\log_2 (x - 1) + \log_2 (3x - 5) = \log_2 (5x - 3) + 2$
$\Rightarrow \log_2(3x^2 + 3x – 5x - 5) = \log_2 [4*(5x - 3)]$
$\Rightarrow 3x^2 – 22x + 7 = 0$
$\therefore$ x = 7, 1/3

35. Find all x so that $|1 – e^{2x}| \leq 5$.

a) $(-\infty, \ln\sqrt{3})$ **b) $(-\infty, \ln\sqrt{6})$** c) $(0, \ln\sqrt{3})$ d) $(0, \ln\sqrt{6})$

35. (b) $|1 – e^{2x}| \leq 5$
Either
$1 - e^{2x} \geq - 5$
$\Rightarrow e^{2x} \leq 6$
$\therefore x \leq \ln\sqrt{6}$
Or
$1 – e^{2x} \leq 5$
$\Rightarrow e^{2x} \leq - 4$
Then $e^{2x} \rightarrow 0$
$\therefore$ Value of x may be $\leq \ln\sqrt{6}$ or $-\infty$

36. A chef cuts a watermelon along its horizontal diameter once and then along its vertical diameter twice at right angle to each other. A slice is removed (other pieces remains intact). What will be the total surface area of the remaining portion?

a) $\frac{17\pi r^2}{4}$ b) $\frac{15\pi r^2}{4}$ c) $\frac{7\pi r^2}{2}$ d) $\frac{13\pi r^2}{4}$ e) $\frac{19\pi r^2}{4}$

36. Required surface area = $4\pi r^2 - \frac{1}{2}\pi r^2 + \frac{3\pi r^2}{4} = \frac{17\pi r^2}{4}$. $\therefore$ option – a.

37. If $x^{\frac{1}{3}} + y^{\frac{1}{3}} + z^{\frac{1}{3}} = 0$, then $(x + y + z)^3$ = ?

a) 27yxz b) 1 c) xyz d) 9yxz

37. $x^{\frac{1}{3}} + y^{\frac{1}{3}} + z^{\frac{1}{3}} = 0$

$\Rightarrow x^{\frac{1}{3}} + y^{\frac{1}{3}} = - z^{\frac{1}{3}} \Rightarrow (x^{\frac{1}{3}} + y^{\frac{1}{3}})^3 = (- z^{\frac{1}{3}})^3$

$\Rightarrow x + y + 3 y^{\frac{1}{3}} x^{\frac{1}{3}} (x^{\frac{1}{3}} + y^{\frac{1}{3}}) = - z$

$\Rightarrow x + y + 3 y^{\frac{1}{3}} x^{\frac{1}{3}} (- z^{\frac{1}{3}}) = - z$

$\Rightarrow x + y + z = 3 y^{\frac{1}{3}} x^{\frac{1}{3}} z^{\frac{1}{3}}$

$\Rightarrow (x + y + z)^3 = 27xyz$. Hence, [1].

38. A man can walk up-hill at the rate of 2½ km/hr and down hill at the rate of 3¼ km/hr. The total time required to walk a certain distance up the hill and return back to the starting point is 4 hr. 36 min. The distance he walked up the hill is

a) 6 km b) 5½ km **c) 6½ km** d) none of these

38. Let x: distance he travelled up the hill. ∴ for covering x he takes $\frac{2}{5}x$ hrs (up hill)

for covering x he takes $\frac{4}{13}x$ (down hill)

By the problem, $\frac{2x}{5}+\frac{4}{13}x=4\frac{36}{60}$ Solving we get, x = 6½ km. Ans. (c)

Short-cut Method :

Ratio of the speeds $=\frac{5}{2}:\frac{13}{4}$ =10 : 13.

∴Ratio of the times taken = 13 : 10.

Total time taken = 4 36/60 = 23/5 hrs.

∴ Duration of uphill journey = 13/23 × 23/5 = 13/5 hrs.

∴ Distance covered = S × T = 5/2 × 13/5 = 6 ½ km. [option –c]

39. If none of the digits 0, 1, 2, 3, 4 be repeated, how many numbers of five significant digits can be formed with them? How many of them are divisible by 4?

a) 96, 24 b) 72, 30 **c) 96, 30** d) 72, 24 e) 72, 36

39. Past—(1) → 5! – 4! = 96

Past–(2) → Last two digits can be 12, 20, 24, 32, 40, 54

∴ No. of nos. = 3! × 3 + (3! – 2!)×3 = 18 + 12 = 30

40. Domain of definition of the function $f(x) = \frac{3}{4-x^2} + \log_{10}(x^3 - x)$, is

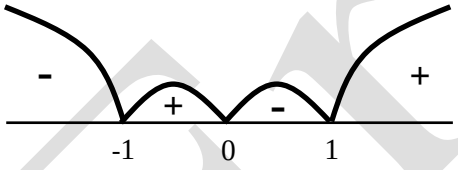
a) (- 1, 0) ∪ (1, 2) ∪ (2, ∞) b) (a, 2)

c) (-1, 0) ∪ (a, 2) d) (1, 2) ∪ (2, ∞)

40. (a). $f(x) = \frac{3}{4-x^2}+\log_{10}\left(x^3-x\right)$

$4 - x^2 \neq 0$; $x^3 - x > 0$;

$x \neq \pm \sqrt{4}$ and $-1 < x < 0$ or $1 < x < \infty$



∴ D = (-1, 0) ∪ (1, ∞) - $\{\sqrt{4}\}$

D = (-1, 0) ∪ (1, 2) ∪ (2, ∞).

Section II – Quantitative Aptitude (Non MCQ) – 20 qs (Time – 40 min)

41. If $P = \begin{bmatrix} 1 & \alpha & 3 \\ 1 & 3 & 3 \\ 2 & 4 & 4 \end{bmatrix}$ is the adjoint of a 3×3 matrix A and $|A| = 4$, then α is equal to :

a) 4 b) 11 c) 5 d) 0

41. (b). $|P| = 1(12 - 12) - \alpha(4 - 6) + 3(4 - 6) = 2\alpha - 6$

Now, adj A = P $\Rightarrow |\text{adj } A| = |P|$

$\Rightarrow |A|^2 = |P|$

$\Rightarrow |P| = 16$

$\Rightarrow 2\alpha - 6 = 16$

$\Rightarrow \alpha = 11$

42. A man bought a number of bananas at 3 for a rupee and an equal number at 2 for a rupee. At what price per dozen should he sell them to make a profit of 20%?

a) Rs. 4 b) Rs. 5 **c) Rs. 6** d) Rs. 7

42. (c) 1st case, 3 banana for 1 rupee.

$\therefore$ 6 banana for 2 rupee.

2nd case, 2 banana for 1 rupee

$\therefore$ 6 banana for 3 rupee.

Total 12 banana for 5 rupee.

Now to make a profit of 20%, price per dozen would be

$= \text{Rs. } 5 \times \frac{120}{100} = \text{Rs. } 5 \times \frac{6}{5} = \text{Rs. } 6$

43. In a survey of 100 students studying various languages, 51 students study German, 31 students study German and not French and 9 students study German, French and Japanese. How many students study both German & French but not Japanese?

a) 0 b) 9 **c) 11** d) 20 e) 15

43. Hence option (c).

44. If $a^2 - b^2 = 120$, find the number of positive integer solutions of a & b.

a) 2 b) 8 **c) 4** d) 16

44. Hence option (c).

45. If the unit's digit in the product ($47^n \times 729 \times 345 \times 343$) is 5, what is the maximum number of values that n may take?

a) 9 b) 3 c) 7 **d) 5** e) 7

45. n can take any odd values i.e. (1, 3, 5, 7, 9) = 5 values.

So, option (d).

46. All the digits of numbers from 50 to 150 are written side by side, i.e. 5051525354……..150. How many 6 are there in the series.

a) 9 b) 10 c) 17 d) 18 **e) 20**

46. On counting we see 20 six.

47. I lent Rs.5000 partly at 10% and partly at 12% interest. After one year I got Rs.525 as interest. How much did I lend at 12 % rate (in Rs)?

a) 1250 b) 2250 c) 2750 d) 5750 e) None of these

47. $\frac{12x}{100} + \frac{50000 - 10x}{100} = 525$

2x =52500-50000

x=1250

Alternate solution

$\frac{525}{5000} = 10.5\%$ 3 : 1

By allegation 10% 12%

10.5

1.5 .5

I lend at 12% rate = $5000 \times \frac{1}{4} = 1250$ Rs

48. In decimal system the base is 10 and hence it has 10 digits, 0, 1, 2, 3, 4, 5, 6, 7, 9. But on the island of pigloos, they follow a number system with base 5 and hence the digits used are 0, 1, 2, 3, 4. Such numbers are in base 5 or penta numbers. Now a number $N = 5^{49} + 1$ in decimal system is written. A student converted this number into its penta equivalent and named it k. Find the number of zeros in k.

a) 49 **b) 48** c) 50 d) 1 e) None of these

48. For this kind of problem take examples and find the series.

$N = 5^1 + 1 \Rightarrow (6)_{10} = (11)_5$

$N = 5^2 + 1 \Rightarrow (26)_{10} = (101)_5$

$N = 5^3 + 1 \Rightarrow (126)_{10} = (1001)_5$

:

:

$N = 5^{49} + 1 \Rightarrow ()_{10} = (100 \ldots. 48 \text{ times } 1)_5$

Hence it has 48 zeros. Hence, option (b).

49. What is the remainder when $23^{79} + 13^{79}$ is divided by 18?

a) 5 **b) 0** c) 43 d) 10 e) None of these

49. $23^{79} + 13^{79}$

Now, any number of form $a^n + b^n$, where a and b are odd will have (a + b) as a factor.

$\therefore$ (23 + 13) = 36 exactly divides the given number.

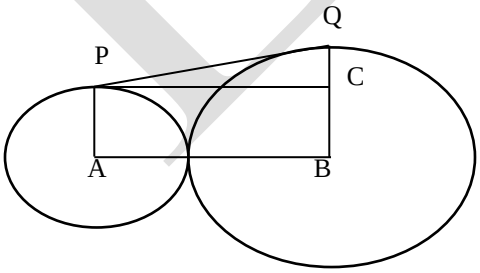
Hence 18 would also exactly divide the given number.

So, the answer is 0. (b).

50. Two circles of radii 4 cm and 9 cm respectively touch each offer externally of a point and a common tangent touches them at the points P and Q respectively. Then the area of a square with one side PQ (in **cm^2**) is

a) 97 **b) 194** c) 72 d) 144

50.



AB = 13 cm

BQ = 9 cm

AP = BC = 4 cm

$\therefore$ CQ = 5 cm

And $\angle PCQ = 90°$

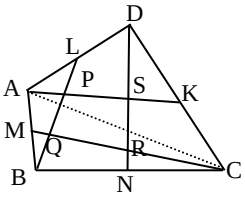
$\therefore$ PQ = $\sqrt{5^2 + 13^2} = \sqrt{194}$

So, Area of square with one side PQ = 194 cm^2

51. *ABCD* is a convex quadrilateral. *M*, *N*, *K* and *L* are the midpoints of its sides. *PQRS* is the quadrilateral formed by the intersections of *AK*, *BL*, *CM* and *DN*. Determine the area of quadrilateral *PQRS*, if the area of the quadrilateral *ABCD* is 3000, and the areas of quadrilaterals *AMQP* and *CKSR* are 513 and 388 respectively.

a) 599 b) 799 c) 2099 d) 2567 e) 640

51. Join AC



ACB + ACD = 3000
AMC + ACK = 1500
PQRS = 1500 – 388 – 513 = 599. Hence, option (a).

52. The number of values of x in the interval $[0, 5\pi]$ satisfying the equation $3\sin^2 x - 7\sin x + 2 = 0$ is

a) 0 b) 5 **c) 6** d) 10

52. (c). $3\sin^2 x - 7\sin x + 2 = 0$, put $\sin x = s$
$\Rightarrow (s - 2)(3s - 1) = 0 \Rightarrow s = 1/3 = \sin\alpha$, say,
($s = 2 = \sin\alpha$ is not possible)
$\Rightarrow x = n\pi + (-1)^n \alpha$, n = 0, 1, 2, 3, 4, 5 in $(0, 5\pi)$.

53. Let M be a 3 × 3 matrix satisfying

$M\begin{bmatrix}0\\1\\0\end{bmatrix} = \begin{bmatrix}-1\\2\\3\end{bmatrix}$, $M\begin{bmatrix}1\\-1\\0\end{bmatrix} = \begin{bmatrix}1\\1\\-1\end{bmatrix}$, and $M\begin{bmatrix}1\\1\\1\end{bmatrix} = \begin{bmatrix}0\\0\\12\end{bmatrix}$. Then the sum of the diagonal entries of M is

53. [9].

Let $M = \begin{bmatrix}a_1 & b_1 & c_1\\ a_2 & b_2 & c_2\\ a_3 & b_3 & c_3\end{bmatrix}$

then $\begin{bmatrix}a_1 & b_1 & c_1\\ a_2 & b_2 & c_2\\ a_3 & b_3 & c_3\end{bmatrix}\begin{bmatrix}0\\1\\0\end{bmatrix} = \begin{bmatrix}-1\\2\\3\end{bmatrix} \Rightarrow \begin{matrix}b_1 = -1\\ b_2 = 2\\ b_3 = 3\end{matrix}$

$\begin{bmatrix}a_1 & b_1 & c_1\\ a_2 & b_2 & c_2\\ a_3 & b_3 & c_3\end{bmatrix}\begin{bmatrix}1\\-1\\0\end{bmatrix} = \begin{bmatrix}1\\1\\-1\end{bmatrix} \Rightarrow \begin{matrix}a_1 - b_1 = 1\\ a_2 - b_2 = 1\\ a_3 - b_3 = -1\end{matrix}$

$\Rightarrow a_1 = 0, a_2 = 3, a_3 = 2$

and $\begin{bmatrix}a_1 & b_1 & c_1\\ a_2 & b_2 & c_2\\ a_3 & b_3 & c_3\end{bmatrix}\begin{bmatrix}1\\1\\1\end{bmatrix} = \begin{bmatrix}0\\0\\12\end{bmatrix} \Rightarrow a_3 + b_3 + c_3 = 12 \Rightarrow c_3 = 7$

$\therefore$ Sum of diagonal elements = $a_1 + b_2 + c_3 = 0 + 2 + 7 = 9$

54. What is the sum of the series?
$10^2 + 20^2 + 30^2 + \ldots\ldots\ldots + 100^2$

a) 36000 b) 37500 c) 38250 **d) 38500**

54. (d) $10^2 + 20^2 + 30^2 + \ldots + 100^2$
$= 10^2 [1^2 + 2^2 + 3^2 + \ldots + 10^2]$
$= 100 * 10 * 11 * 21 / 6 = 38500$

55. Consider 20 infinite geometric progressions, whose first terms are 2, 3, 4 …. 21 respectively, and common ratios are 1/3, 1/4, 1/5, … 1/22 respectively. If S_1, S_2, S_3 ……. S_{20} respectively denote the sums of these 20 geometric progressions, find $S_1 + S_2 + S_3 + …. S_{20}$.

a) 80 b) 320 c) 360 d) **250**

55. $S = \frac{a}{1-r}$ [For infinite series]

$S_1 = \frac{2}{1-\frac{1}{3}} = 3$

$S_2 = \frac{3}{1-\frac{1}{4}} = 4$

$S_3 = \frac{4}{1-\frac{1}{5}} = 5$

…….

$S_{20} = \frac{21}{1-\frac{1}{22}} = 22$

Now, $S_1 + S_2 + S_3 + …… + S_{20} = 3 + 4 + 5 + …….. + 22$

$= \frac{22 \times 23}{2} - 3 = 250.$

56. The number of arrangements of the letters of the word BANANA in which the A's do not appear adjacently is —

a) 40 b) 48 c) 30 d) 32 **e) 12**

56. The different ways of arrangement are :

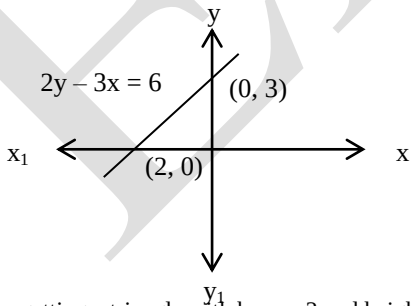
A _ A _ _ A arrangement = $\frac{3!}{2!}$ = 3 ways.

A _ A _ A _ arrangement = 3 ways.
_ A _ A _ A arrangement = 3 ways.
A _ _ A _ A arrangement = 3 ways.
So total of 12 ways.

57. What is the area bounded by the lines (in sq unit)?
2y – 3x = 6, x = 0, y = 0?

a) 2 b) 4 c) 1 **d) 3**

57. (d)



We are getting a triangle with base = 2 and height = 3
∴ Area = ½ * 2 * 3 sq. unit = 3 sq. unit

58. From a huge cask containing pure milk, 9 litres is drawn out and equal quantity of water is put into it. This process is repeated once again. The ratio of quantity of milk and water after the second operation is found to be 16 : 9. How much milk were there in the beginning in the cask (in litres)?

a) 64 b) 40 c) 54 **d) 45** e) 50

58. By the above concept

$$\left(\frac{a-9}{a}\right)^2 = \frac{16}{25}$$

$$\frac{a-9}{a} = \frac{4}{5}$$

=> a = 45 litres. Hence, option (d)

59. The numbers from 1 to 42 are written side by side as 123456……42. What is the remainder when this number is divided by 9?

a) 0 b) 1 **c) 3** d) 6 e) 2

59. (1, 2, 3, …….42)
The sets (123….9), (111213……19), (2122…..29), (3132……39) are divisible by 9.
So, number left are 10 20 30 40 41 42
So sum of digit is 21
So remainder is 3. Hence, option (c)

Alt. Solution

$$1 + 2 + 3 + \ldots\ldots + 43 = \frac{42 \times 43}{2}$$

$$\frac{21 \times 43}{9} \Rightarrow 3$$

60. $4^{61} + 4^{62} + 4^{63} + 4^{64} + 4^{65}$ is divisible by

a) 3 b) 5 **c) 11** d) 17 e) None of these

60. $4^{61}(1+4^1+4^2+4^3+4^4) \Rightarrow 4^{61}(341)$.
S0, it is divisible by 11.

Section III – Verbal Ability – 40 Qs (Time – 40 min)

Directions for questions 61 to 66: Read the following passage carefully and answer the questions given below.

In the run up to the Budget, people expected strong measures on two of the most pressing concerns of the aam admi: inflation and corruption. Around 95% of the population of the country does not pay any income tax so their interest in direct tax proposals is at best marginal.

On inflation, the FM announced that fiscal deficit has improved and is budgeted to improve even further in 2011-12. However, a closer examination of the figures revels that the fiscal deficit has not reduced; it has, in fact, gone up. What has reduced is the ratio of the fiscal deficit to the GDP at current price. Because of inflation, the GDP at current price has soared by 20 % (as against real GDP growth at 8-1/2%). It is due to this inflationary effect on GDP that the ratio of deficit to GDP appears to reduce, without any improvement in the real fiscal deficit.

The FM mentioned the huge inflation in food price is not at all increasing the incomes of farmers. On the contrary, they remain steeped in poverty and farmer suicides continue apace. In India, there is a huge gap between the price realised by farmer and price paid by consumers. This is because there are too many layers in the food storage, distribution and marketing chain, and these intermediaries do not have proper storage or distribution facilities. As a result, the FM estimates that 40% of the farm produce is wasted. It is now acknowledged by experts that the only way out is to induct far fewer layers of middlemen; also these middleman should be substantial organizations with proper storage and distribution facilities, who can thereby avoid waste. Surprisingly, though the problem is acknowledged, no very specific steps are proposed in the budget to induct large organizations indirectly buying from farmers and selling to consumers.

Besides food price, the other bugbear for the common man is oil price. Because of political unrest in a number of oil producing countries, international oil prices have now reached unprecedented levels. However, the budget proposal for 2011-12 actually shows a reduction in the subsidy for oil production. This can only mean there will be an even steeper increase in prices of petroleum products in 2011-2012.

Black money has been a topic much in the news, especially following a series of scams, where it is suspected that huge sums have been salted away in various tax havens abroad. In response to this the budget proposes wide ranging powers of investigation, whenever an Indian entity has any transactions with entities in the tax haven countries, a list of which will be notified. These stringent provisions will mean that those with black money in the tax haven countries will not dare to utilize this black money for any transactions in India. However, it will not by itself stop generation or salting away the black money. All it will stop is the utilization of the black money in many Indian entities.

61. What is the central idea of the passage?
    - **a) Budget of 2011-12 has not been able to** address the needs of the common people.
    - b) Two pressing concerns – inflation and corruption have not been properly dealt with.
    - c) Common people have not benefited much from this budget.
    - d) Black marketers will be on guard.
    - e) None of these

62. Which one of the factors confirms the rising level of the fiscal deficit?
    - a) Budget of 2011-12 is deceptive for the people.
    - b) The ratio of the fiscal deficit to the GDP at current price has been reduced.
    - **c) The inflationary effect on GDP makes it appear as if the ratio of deficit to GDP has been reduced.**
    - d) 95% of the population does not pay any tax.
    - e) None of these

63. How can one say that there will be no utilization of black money in different Indian entities?
    - a) Powers have been vested with the investigating department.
    - b) Foreign transaction will be notified immediately.
    - **c) Strict vigil and enlistment of transactions in the tax haven countries have forced black marketers to abstain from further investment.**
    - d) All the above factors.
    - e) None of these.

64. Which one of the following is not true in the context of the passage?
    - a) Farm produce is wasted.
    - **b) Farmers are now more prone to committing suicide.**
    - c) It is a critique on Budget 2011-12

d) There is no real improvement in the real fiscal deficit
e) None of these

65. Which one of the following steps will improve the life of farmers?
a) Induction of fewer layers of middlemen.
b) Detection of the core of the problem.
c) Middlemen should be substantial organization with proper storage to distribute facilities.
d) Induction of large organizations in directly buying from farmers and selling to consumers.
e) None of these

66. Why will there be an even steeper increase in prices of petroleum products?
a) Political unrest in oil producing countries.
b) More consumption of petroleum products.
c) A reduction in the subsidy for oil products.
d) All the above.
e) None of these.

61. (a) The pressing need of the people i.e. price hike in petroleum products and other essential commodities have not been addressed properly. On the contrary this budget could place the entire scenario in a boiling cauldron of debts and exploitation.

62. (c) It is due to this apparent reduction, one tends to conclude that there has been a reduction in fiscal deficit, but there is no improvement in reality.

63. (c) Whenever an Indian entity tries to transact with any one of the tax haven countries, the former comes under the surveillance of varied stringent rules. The surveillance has deterred him/her from utilizing the black money in many Indian sectors.

64. (b) The budget hasn't thrown the farmers on the verge of committing suicide; the trend has been in process for a longtime; the budget has become one of the causes for them to do so.

65. (d) Only the induction of these kind of organization will abolish the layer of middlemen and will establish direct trade link with farmers .

66. (c) This is only valid. The sentence in (2) has no reference in the passage; hence (4) is nullified.

Directions for questions 67 to 72: Read the following passage carefully and answer the questions below it. Certain words are given in bold to help you locate them while answering some of the questions.

Girish Krishnamurthy is like a cat on a hot tin roof, buzzing with myriad thoughts on maximising opportunities. Settling into a job and spending years together in one place has never been his style of functioning. "I can be very unemotional about leaving a place of work. I totally love my job, but if I ever feel bored of it I just move on," says the Kaseya India managing director. Kaseya is a leading provider of IT automation software, head-quartered in Switzerland.

Girish was born into a very middle class family in Ooty where his dad worked in the income tax department. He moved to Chennai to do his schooling. His fellow students always found themselves short of what Girish could accomplish at school, no matter how hard they tried.

Girish used to top the class with ease, and soon he was taking tuition classes for other students. Being so far ahead of the pack, he even started special classes for underprivileged children who could not afford to attend school. "Maths was my pet subject. It's the queen of all sciences."

He completed his diploma in electrical and electronics engineering, while continuing to help out peers with his tuition classes. These classes were turning out to be a big hit in the neighbourhood and he started to think of **spinning** it into a business. And that's what he eventually did. At the same time, he did enroll for his degree course and completed it too.

But his mother was not very happy that he was running his tuition business, without going in for any higher studies. He was not pursuing a high paying job either. That's when she suggested that Girish take a look at computers. "I was surprised by her comment. Even today I wonder how she suggested computers to me. It was a **fledgling** industry then."

Girish wanted to prove to his mother that he could make a success of it, and joined a firm called IPA in Bangalore. He told its managing director that he wanted to stay back after work and learn more about computers. The MD gave him the green signal on the condition that he would surely switch off all the lights before he left the workplace. But his immediate boss was not aware. "In those days the job environment used to be always hostile. No one wanted anyone to do any better."

In a year's time, he grew in the company. Not only he did his own job very well, but also formulated a report on income tax **loopholes** in the firm. That was outside his frame of work, but he could prove to the management that the firm could lose big amounts if corrective action was not taken. His **stock** in the company rose dramatically thereafter.

Girish moved on, the moment he felt saturated. He **ventured** out on his own and started a firm called Omsoft which created an application software for chartered accountants. 'Even today it is a big draw," he says. He also did a lot of work for companies like UB at that time. Not satisfied, he moved on to the US to understand how the industry was taking shape globally. After establishing his network, he **floated** a new firm called MDC system in partnership with an American friend. He sold it later, to join KPMG. He then moved to Talisma, and Kaseya followed soon after.

As we said earlier, it's hard to match his career momentum. "If there's an opportunity to do something, I want to grab it. It's very difficult for me to sit still, when I know there is something I could create. This is a very strong impulse within me. All my career shifts have been dictated by this theory."

67. Why was Girish taking tuition classes?
    a) He needed money b) He wanted to eke out a career in academics
    c) He used to top the class d) People forced him to take teaching as a career
    e) None of these.

68. Why was his mother unhappy with him?
    a) Because he was running his tuition business **b) He was not pursuing higher studies.**
    c) He was not into a high paying job. d) He was hankering after money.
    e) None of these.

69. How did he grow in IPA?
    a) He was practising computers past his office hours.
    b) The job environment was hostile.
    c) He formulated a report on Income tax loopholes.
    d) He showed the company the way to follow correct accounting method.
    e) None of these.

70. What prompted Girish to spin his tuition classes into a business?
    a) After completing his diploma in electrical and electronics engineering he was into tuition
    b) His peer group encouraged him.
    c) He needed financial settlement.
    d) These classes were turning out to be a big hit in his locality.
    e) None of these.

71. Why has he been termed as 'a cat on a hot tin roof'?
    a) He is full of myriad thoughts on maximising opportunities.
    b) He never believes in settling into a job and spending years together in one place.
    c) He is very unemotional about leaving a place of work.
    d) He was always in a hurry to grab the best opportunity.
    e) None of these.

72. Why did he always move on?
    a) He was an opportunist. b) He abhorred stagnation.
    c) He moved on when he felt the moment to be saturated.
    d) He was extremely ambitious. e) None of these.

67. (c). He used to top the class with ease; he started helping out his peer group with their studies; eventually he extended his helping hand for the underprivileged as well.

68. (b). He was not pursuing higher studies. His mother was bothered about this factor; this primarily leads to other associated factors as well.

69. (c). He formulated a report on Income tax loopholes in the form. He also avowed the necessity of following corrective action in order to lose big amounts.

70. (d). His initial effort is now turning into a popular saga; so he wants to encash this opportunity by transforming it into a business.

71. (d). He was always in a hurry to grab the best opportunity that came in his way.

72. (c). When the situation was saturated and he could no longer grow, he opted to move on.

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Direction for questions 85 to 87: For each of the following questions complete the given sentence with the best possible option.

85. This could be only known to God for only those who make things can truly know what they are and for what purpose have they been made. Hence we do not, in this sense know the external world – nature – for we have not made it. (……)
    a) But since men are directly acquainted with human motive, they cannot know nature.
    b) Man has failed to understand and control nature.
    c) **Only God, who created** it, knows it in his fashion.
    d) Man is not as powerful as he thinks to be.

86. (…….)Moscow's first strike objective is the retaliatory missile launch complex at the Air Force base, California, where the reinforced concrete missile silos have walls fifty to sixty metres thick and built far underground.
    a) Soviet Missiles can hit within sixty metres of such target.
    b) The accuracy of intercontinental ballistic missiles depends on quality of the computer.
    c) The Soviet Union and USA each has a priority hit list.
    d) The silos can withstand strong earthquakes; their only vulnerability is hydrogen bomb explosion.

87. Viewed through this prism, Bush does not see his actions as being those of US world hegemony or of someone who wants to exploit Iraq for its oil wealth. (-----). He sees action against Iraq as being all the more urgent because of the backdrop of global terrorism.
    a) But doesn't common sense say that this is USA bullying the rest of the world?
    b) He sees the issue as separating those who wish to extend the rule of the UN law to global security and those too weakened to do so.
    c) He sees it as a battle of justice to all from a tyrant who has denied all Iraqis their basic freedom.
    d) But if it isn't what is?

85. CADEB is the correct sequence. C introduces the concept or theme of the passage. A elaborates why the previous statement is made; the reason or the fact has been mentioned. D states what we are ignorant of. E gives an example of the same point. B comes to a definition of self-deception through the example.

86. The correct sequence is AECBDF. A opens the argument by making a statement about desire. B and E both refer to happiness in a way that they cannot be placed together. We see that "desire" in A connects to ""suppress" in E. Thus E follows A. C speaks on concentration, connecting with B which mentions it as another ("also one") key component of happiness. D presents the inability to concentrate. F concludes about inner peace, coming last. [6 liner (ABCDEF) / Logical / Medium]

87. (c) directly connects to the premise of only the creator knowing the creation fully well. Thus God knows the external world, as he has made it. (a) is incorrect as it changes the argument with "But", but restates the same argument as the preceding statement. (b) and (d) are completely irrelevant to the premise. Hence (c). [End statement / Logical / Easy]

Directions for questions 88 to 90: Fill in the blanks with best possible option.

88. Birds are…. of air and hence are kept in an ……

a) citizens, apiary
b) denizens, aviary
c) creatures, enclosure
d) Inhabitants, ave

89. The…..,demanding ..… in our oak tree keep the parent birds….. hunting for food.
a) **noisy, fledglings, frantically**
b) quite, fledglings, rarely
c) noisy, little ones, on
d) rarely, chics, rarely

90. Your…. ,finding you… to argument, perhaps would try wit.
a) friend, submitting
b) associate, succumbing
c) adversary, hackneyed
d) opponent, impenetrable

88. 2: The implication is that birds reside in the air, and hence are kept in aviaries which basically allow a large space for enclosing birds that allows them to fly. Hence, 2 is the best option.

89. 1: This is the best fit. The option that can go with … hunting for food is frantically since it is mentioned that the fledglings are demanding, and if they are quiet then their parents will not be so frantic. Hence, option 1.

90. 4: The suggestion that the opponent would try something else means that the device used at present is not working, so it means that the opponent, finding that one is unaffected (not penetrated) by argument, would try wit.

Directions for questions 67 – 69 : Fill in the blanks with the most appropriate set of words.

91. Scientists' pristine reputation as devotees of the disinterested pursuit of truth has been _____ by recent evidence that some scientists have deliberately _____ experimental results to further their own careers.
a) Reinforced … published
b) resuscitated … ..challenged
c) Exterminated … replicated
d) compromised … fabricated

91. Hence option (d).

92. American Pioneers moved west with tremendous hope but often only _____ awaited them, given the _____ realities of the new land.
a) disappointment , flippant
b) success, awaited
c) surprise, golden
d) disillusionment, harsh

92. Hence option (d).

Directions for questions 93 to 97: Read each sentence to find out whether there is any error in it. The error, if any, will be in one part of the sentence. The number of that part is the answer. If there is no error, the answer is (E). (Ignore the errors of punctuation, if any.)

93. (a) New Delhi today said Dorje was no (b) **Karmapa and can be questioned by** (c) security agencies following the seizure of (d) at least Rs. 6 crore in Indian and foreign currencies. (e) No error.

94. (a) A highly placed government official said (b) that if any criminal offence was established, (c) Dorje would be tried (d**) at a court of law like any other person**. (e) No error

95. (a) But New Delhi has severely curbed (**b) his movements over recent years** (c) on suspicion that Beijing (d) had stage-managed his escape (e) No error

96. (a) Some reports said the money (b) was meant to buy a five-acre (c) plot in Himachal's Kangra district; (**d) two early attempts by Dorje were scuttled**. (e) No error

97. (a) **Sources said China may want** (b) Dorje to do in the (c) Indian Himalayas what Beijing (d) had done in Nepal. (e) No error

93. The error is in segment 2; the correct form is : could be
94. The error is in segment 4; the correct form is: in a court of law
95. The error is in segment 2; the correct form is : in recent years
96. The error is in segment 4; the correct form is: two earlier
97. The error is in segment 1; the correct form is : may have wanted

Directions for questions 98 to 100: A number of sentences are given below, which when properly sequenced form a coherent paragraph. Each sentence is labelled with a letter. Choose the most logical order of sentences, between sentences 1-6 from among the four given choices to construct the paragraph.

98. 1. In the pit Meadow picked his way to the core of an earth-encrusted lump, which proved to be a large bone.
A. Harappans may also have tamed elephants for heavy labor.
B. In another excavation the archaeologists found a small terra-cotta elephants head painted white and red, colours that Indian mahouts still daub on working pachyderms.
C. "There were elephants around here", he said, "and the people hunted them to make ornaments".
D. A specialist in Zooarchaeology, he recognized it as an elephant's mandible, at which I expressed surprise.
6. Kenoger regarded the row of half a dozen bricks, cleared by his trowel – a "ghost wall", he called it.
a) DBCA **b) DCAB** c) DBAC d) DCBA

99. 1. Insurgency in the two north eastern states of Meghalaya and Tripura took a toll of 32 lives in mid-August.
A. On August 20 members of the National Liberation Front of Tripura (NLFT) ambushed a truck carrying jawans of the Tripura State Rifles from the hill town of Takarjula, about 35 km from Agartala, killing 20 of them on the spot and injuring five.
B. The security personnel could do little as the group of militants unleashed a barrage of gunfire from the paddy fields on either side.
C. In order to scuttle the Independence Day celebrations guerilla outfits in Meghalaya massacred 12 civilians on August 13.
D. The militants, who had positioned themselves behind hillocks on both sides of the road, hurled grenades at the truck and brought it to a halt.
6. The militants took away 19 self-loading rifles, a light machine gun and a large quantity of ammunition from the truck.
a) DCAB b) ACDB **c) CADB** d) CABD

100. 1. The Ottoman Empire was the successor to the Byzantine Empire in controlling much of the Balkans, as well as the Anatolian peninsula (modern day Turkey) as well as the countries on the eastern and southern rim of the Mediterranean.
A. The Ottomans were well organized warriors, but also able administrators of their conquered provinces.
B. It was begun in the early thirteenth century by Turkic tribesmen in the region of Turkey, and expanded systematically from there.
C. Thus, the ferocity of the conquests, and slaughters of opponents was generally limited to the battlefield.
D. In this respect they differed from their related empire builders, the Mongols, who were ferocious warriors, but less systematic rulers.
6. While at the battle of Kosovo in 1389, the Ottomans systematically slaughtered all of the remaining Serbian and Bulgarians soldiers, they deliberately avoided mass pillaging of their towns, churches, and institutions, in the hopes of having a peaceful post-conquest period.
a) CDBA **b) BADC** c) BCAD d) DBCA

98. The correct sequence is DCAB. The "it" in D refers to the "large bone" in 1 as a "mandible". C is the continuation of the discovery. Further A is linked to C through the phrase "tamed … labor". B changes the argument to "another excavation". 6 gives yet another example.

99. The correct sequence is CADB. 1 mentions the total casualties of insurgency in the states of Meghalaya and Tripura. C states the first incident that claimed 12 lives, by date coming earlier. A speaks of the second incident that took 20 more lives. The ambush that resulted in the second incident is mentioned in D. B describes the actual attack and then 6 concludes by speaking of the aftermath of the incident. [6 liner (1ABCD6) / Keyword / Medium]

100. The required sequence is BADC. (1) introduces the Ottoman Empire. "It" in B refers to the Empire, and thus B follows (1). A follows B as connects to "systematically". D brings in the aspect of the Ottomans being different from the Mongols. [6 liner (1ABCD6) / Logical / Medium]