CAT Quantitative Aptitude Questions for Practice Set 4 - Solutions

Difficulty Level – Medium

1. (D)
Let the interest rate be r percent interest earned from 1.2 lakh at the end of year
= 1,200,000 × r /100
= 1200r
From 1.8 lakh, = 8/12 × 1, 80,000 × 2r/100
= 2400r
Total interest = 3600r = 54000
r = 15 percent

2. (A)

$$1-\log 10_{10}5 = \frac{1}{3}\left[\log 10_{10}\frac{x\times 5^{1/3}}{2}\right]$$

$$3[\log 10_{10}10 - \log 10_{10}5] = \log 10_{10}\frac{x\times 5^{1/3}}{2}$$

$$\log 10_{10}2^3 = \log 10_{10}\frac{x\times 5^{1/3}}{2}$$

$$2^3 = \frac{x\times 5^{1/3}}{2}$$

$$x = \frac{2^4}{5^{1/3}}$$

Hence, m + 3n = $4+3 \times \frac{1}{3} = 5$

3. (A)
f(3n) – f(3n– 3) = n
n = 1
f(3) – f(0) = 1
f(0) = 0
n = 2
$f(6)-f(3)=2$
$\vdots \quad \vdots \quad \vdots$
f (3n) – f(3) = 2 + 3 + 4+……………..+ n
f(3n) = 1 + 2 + 3 +……………..+ n

$$= n\frac{(n+1)}{2}$$

∵ $f(13^{12}) - f(3\times 3^{11})$

$$\frac{3^{11}}{2}\left(3^{11}+1\right)=\frac{3^{22}+3^{11}}{2}$$

Hence, remainder $\left[\dfrac{\dfrac{3^{22}+3^{11}}{2}}{10}\right] = 8$

4. (A)
Factorised from = $2^4 \times 3^4 \times 5^2 \times 7^2$
Total no. of factor = $5\times 5 \times 3 \times 5$
= 225 factors
113^{rd} factor = $\sqrt{N}$
i.e. $7 \times 5 \times 3^2 \times 2^2 = 1260$

5. (A)
It is given average of 24 numbers = 59.5
Sum = 59.5 ×24 = 1428
Let the numbers erased be 'm'
$1428 + m = 2\left(n\times 25 + \dfrac{25\times 26}{2}\right)$
1428 + m = 50n + 650
50n – m = 778
Least value 'n' can take 16
(i) for n = 16, m =22
Series $\Rightarrow$ 2(17, 18… 41)
i.e. 34, 36, 38 ….82
from this series we cannot remove 22. So, this case is not valid.
(ii) for n = 17 , m = 72
Series $\Rightarrow$ 2(18, 19… 42)
Only this case is valid
Average (A) = $\dfrac{(36 + 84)}{2} = 60$
Sum of series after removing 72 and adding next consecutive even number
1500 – 72 + 86 = 1514
Average (C) = 1514/25 = 60.56
| A – C | = | 60 – 60.56 |
= 0.56

6. (C)
Total numbers of ways = 5! × 6!
Numbers of ways in which men can sit such that no men sat to the left of the women from his team
i.e. Derangement of 6
$D_6 = 6!\left[\dfrac{1}{0!}+\dfrac{1}{1!}+\dfrac{1}{2!}+\dfrac{1}{3!}+\ldots\ldots\ldots\dfrac{1}{6!}\right]$
= 265
F (0) = 5! × 265
Probability = $\dfrac{5!\times 265}{6!\times 5!} = \dfrac{53}{144}$

7. (C)

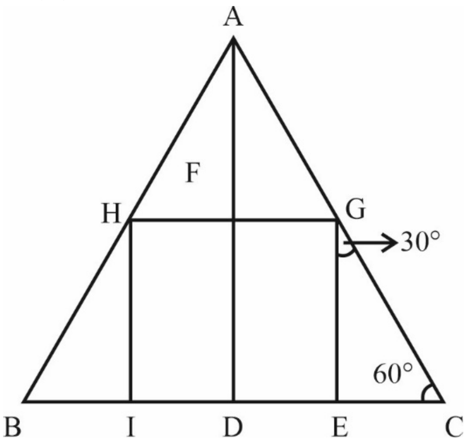
Let he offered ‘n’ different flowers

October has 31 days

${}^{n}C_4 \geq 31$

Minimum value of n can take 7

8. (C)



Let the side of Δ = a

CD = a/2

Let EC = x

In Δ GEC

GE/EC = tan60 = $\sqrt{3}$

GE = $x\sqrt{3}$

DE = a/2 – x = FG = HF

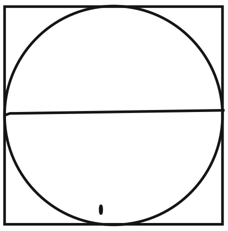
GE = HG

$$x\sqrt{3} = \frac{a}{2} - x + \frac{a}{2} - x$$

$x\sqrt{3}$ = a – 2x

$$x = \frac{a}{\sqrt{3}+2}$$

$$GE = x\sqrt{3} = \frac{a\sqrt{3}}{\sqrt{3}+2}$$



r = side of square ÷ 2

$$r = \frac{a\sqrt{3}}{4+2\sqrt{3}}$$

ratio = a/r

$= \dfrac{a\ (4+2\sqrt{3})}{a\sqrt{3}}$

$= \dfrac{4+2\sqrt{3})}{\sqrt{3}} = \dfrac{4}{\sqrt{3}} + 2$

9. (B)
x, a, b, y are in GP
a = xr
$b = xr^2$
$y = xr^3$
$r = \left(\dfrac{y}{x}\right)^{1/3}$
rewrite,
$a = x^{2/3}.y^{1/3}$
$b = x^{1/3}.y^{2/3}$
a × b = x × y
$a^3 + b^3 = x^2y + y^2\ x$
= xy(x+y)
= xy (2A) …………… $\left[\dfrac{x+y}{2} = A\right]$
Hence, n = 2

10. (C)

Sol1	20percent(0.6)	3L
Sol2	40percent(0.4)	1L
Sol3	1L	4L
Sol4	XL	3L
Sol5	3.5L	7L

1 + x = 3.5
x= 2.5
Required percent y = $\dfrac{2.5}{3} \times 100$ = 83.33 percent

11. (A)
$\dfrac{1}{x} = \dfrac{1}{15} - \dfrac{6}{y}$

$\dfrac{1}{x} = \dfrac{y-90}{15y}$

$x = \dfrac{15y}{y-90}$ ______equation 1
i.e. y = 90+y,
$1 \le y_1 \le 9$
y_1 is odd
Equation 1 becomes

$$x = \frac{15(90 + y_1)}{y_1}$$

$$= 15 + \frac{90 \times 15}{y_1}$$

y_1 can take 1,3,5,9

y=91, 93, 95, 99

12. (A)

$P_1 + P_2 + P_3 = 59$

P_1 and $P_2 \rightarrow$ minimize

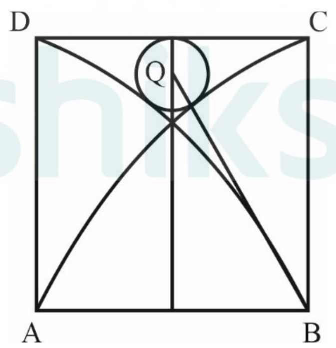
Then $P_3 \rightarrow$ minimum i.e. 47

P_1	P_2	P_3
5	7	47
5	11	43
3	13	43
5	13	41
5	17	37
3	19	37
5	23	31
7	23	29

So, only possible value of P_3 can take $\rightarrow$ 29, 31, 37, 41, 43, and 47

Total 6 values

13. (A)



Let the radius of circle be ‘r’

In Δ QPB

OP = 12 – r

PB = 6

QB = 12 + r

$(12+r)^2 = (12-r)^2 + 6^2$

r = ¾

Area of circle = πr^2

= 22/7 × 3/4 × 3/4

$= \frac{99}{56}$ sq cm

14. (A)

Let $f(x) = ax^2 + bx + c$

f(0)= 2

$2 = a(0)^2 + b(0) + c$
$c = 2$
$f(-2) = 3$
$a(-2)^2 + b(-2) + 2 = 3$
$4a - 2b = 1$ ……….. (1)
The given equation has a maximum value at $x = -2$

$$\frac{-b}{2a} = -2$$

$b = 4a$
put in equation 1

we get, $a = \frac{-1}{4}, b = -1$

f(6)= $\frac{-1}{4}(6)^2 + (-1)6 + 2$

$= -13$

15. (A)
$a + b + c + d = 7$
$a \geq 0, b \geq 0, c \geq 1, d \geq 1$
(a, b, c, d are the numbers of balls)
Let $c = c' + 1 = 0, 0 \leq c' \leq 5$
$d = d' + 1 = 0, 0 \leq d' \leq 5$
$a + b + c' + d' = 5$
Numbers of solution = ${}^{5+4-1}C_{4-1}$
$= {}^8C_3 = 56$

16. (A)

	Aman	Baman	Daman
Number of notebook	1	10	25
Amount	14	130	300
Profit%	a percent		b percent

For Aman,
SP of 1 book = 14Rs.

CP of 1 book = $\frac{100}{(100+x)} \times 14$

For Baman,
SP of 1 book = 12Rs.

CP of 1 book = $\frac{100}{(100+y)} \times 12$

Price of all notebooks is same, therefore.

$$\frac{100}{(100+x)} \times 14 = \frac{100 \times 12}{100+y}$$

$100 + 7y = 6a$
$100 = 12y - 7y$; [x=2y]
$5y = 100$
$y = 20$

a = 40

CP each notebook = $\frac{100\times12}{100+20}$ = 10Rs.

In his sales with Daman, he sold 10 books to her for Rs. 130

CP of 10books = Rs. 100

Profit percent = $\frac{130-100}{30}\times100$

=30percent

17. (B)

$f(x) = \frac{x}{4x^2+7x+9}$ .... (1)

Divide by x in numerator and denominator equation (1) can be written as $f(x) = \frac{1}{4x+7x+\frac{9}{x}}$

f(x) is maximum, when the denominator is minimum we have to find the minimum value of $4x+\frac{9}{x}$,

so, denomination will also minimum

we know that, AM ≥ GM

$$\frac{4x+\frac{9}{x}}{2}\geq\sqrt{4x\times\frac{9}{x}}$$

$$\frac{4x+\frac{9}{x}}{2}=6$$

$$4x+\frac{9}{x}=12$$

The minimum value of $4x+\frac{9}{x}$ is 12

Therefore, the maximum value of f(x) = $\frac{1}{12+7}=\frac{1}{19}$

18. (B)

p and q are the roots of the equation $x^2 - 4ax + 3 = 0$

pq = 3

Similarly the constant term of $x^2 - 2bx + c = 0$

Product of $\left(\frac{2}{p}-q\right)and\left(\frac{2}{q}-p\right)$

Hence, c = $\frac{4}{pq}-2-2+pq=\frac{1}{3}$

19. (A)

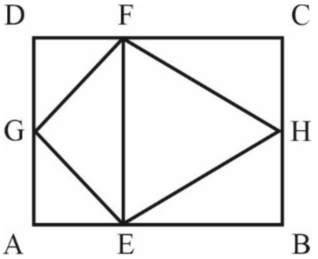
Let $y = 2^{111x}$ then, $\frac{1}{4}y^3+4y=2y^2+1$

$\Rightarrow y^3 - 8y^2 + 16y - 4 = 0$

Let three real roots be a, b and c then abc = and corresponding values of x be x_1, x_2, and x_3

$2^{111(x_1 + x_2 + x_3)} = 4$
$111(x_1 + x_2 + x_3) = 2$
$x_1 + x_2 + x_3 = 2/111$
m + n = 2 + 111 = 113

20. (B)



Since AE: EB is same as DF : EF Hence, AD must be parallel to BC
So, area of Δ EFG is 50percent of area of rectangle ADFE
So, area of Δ EFH is 50percent of area of rectangle BCDE
Hence, area of EFGH is 50percent of the area of parallelogram ABCD