Quant Mega Quiz for SSC CGL Tier – 2 (Solutions)

S1. Ans.(c)

Sol.

5% answered all and 5% answered none

Remains = 90%

Candidates percentage answered 1 question

$= 90 \times \frac{25}{100} = 22.5\%$

Candidates percentage answered 4 questions

$= 90 \times \frac{20}{100} = 18\%$

All these makes (18 + 22.5 + 10) = 50.5%

Remaining percentage of candidates = 49.5%

Let the total number of candidates = x

$x \times \frac{49.5}{100} = 396$

$x = \frac{396 \times 100}{49.5}$

x = 800

S2. Ans.(b)

Sol.

Women $= \frac{43}{83} \times 311250 = 161250$

Men = 311250 – 161250 = 150000

∴ Total number of literate person

$= 161250 \times \frac{8}{100} + 150000 \times \frac{24}{100}$

= 48900

S3. Ans.(d)

Sol.

Let the number of students be x. Then,

Number of students either above 8 years of age or of 8 years = (100 - 20)% of x = 80% of x.

so 80% of x = 48 + 2/3 of 48

=> 80/100 x = 80

=> x = 100.

S4. Ans.(b)

Sol.

5T + 9C = Rs. 23,400

↓ ↓

(+10%) (+10%+ 10%)

10% profit of 9 chairs = 3030 – 2340 = Rs. 690

100% (9 chairs) = Rs. 6900

C.P of 3 chairs = Rs. 2300

S5. Ans.(b)

Sol.

Let CP of 1 chair = Rs. 1

$\therefore \frac{Profit}{CP} = \frac{60}{135} = \frac{4}{9}$

CP	:	SP	
$(143 + 26) \times 9$	:	$13 \times (143)$	CP : SP
	↓		$= 9 : 11$
169×9	:	13×143	

$\therefore$ profit % $= \frac{2}{9} \times 100 = 22\frac{2}{9}\%$

S6. Ans.(a)

Sol.

CP → SP ($+5 \times 83$)

11×83 : 16×83

100×16 : 83×16

(-17×16)

$\Rightarrow$ Total profit $= 83 \times 5 - 17 \times 16 = 143$

$\therefore$ Profit % $= \frac{143}{2513} \times 100 = 5.69\%$

S7. Ans.(d)

Sol.

Let x → number of apples

y → number of oranges

$SP_A = 23$ $SP_O = 10$

$CP_A = 20$ $CP_O = 8$

Now,

$23x + 10y = 673$

↓ ↓

$x = 21$ $y = 19$

(by hit & trial, satisfying $x > y$)

$\therefore$ Profit% $= \frac{673-572}{20\times21+8\times19} \times 100$

$= 17.65\%$

S8. Ans.(b)

Sol.

$58\frac{1}{3}\% = \frac{7}{12}$

Bought 19 → Discount → Amit 12 → Profit → Sold 19

% discount $= \frac{7}{19} \times 100 = 36\frac{16}{19}\%$

S9. Ans.(c)

Sol.

$$\begin{matrix} SP \rightarrow \\ MP \rightarrow \end{matrix} \left(\frac{39304}{64000}\right)^{\frac{1}{3}} = \frac{17}{20}$$

For two years

$$\begin{matrix} SP \rightarrow \\ MP \rightarrow \end{matrix} \left(\frac{17}{20}\right)^2 = \frac{289}{400} \begin{matrix} \xrightarrow{\times 16} Rs.\,4624 \\ \xrightarrow[\times 16]{} Rs\ 6400 \end{matrix}$$

S10. Ans.(b)

Sol.

CP	:	SP
20	:	29
100	:	77
1000	:	1120
880	:	1000
1000	:	1421

Profit = 42.1%

S11. Ans.(c)

Sol.

$2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta) + 2$

$= 2\{(\sin^2\theta + \cos^2\theta)^3 - 3.\sin^2\theta.\cos^2\theta(\sin^2\theta + \cos^2\theta)\}$

$-3\{(\sin^2\theta + \cos^2\theta)^2 - 2\sin^2\theta.\cos^2\theta\} + 2$

$= 2(1 - 3\sin^2\theta.\cos^2\theta) - 3(1 - 2\sin^2\theta.\cos^2\theta) + 2$

$= 2 - 6\sin^2\theta.\cos^2\theta - 3 + 6\sin^2\theta.\cos^2\theta + 2$

$= 1$

S12. Ans.(c)

Sol.

$x = \operatorname{cosec}\theta + \sin\theta$

And,

$y = \sec\theta + \cos\theta$

put $\theta = 45^\circ$

$$x = \sqrt{2} + \frac{1}{\sqrt{2}} = \frac{3}{\sqrt{2}}$$

$$y = \sqrt{2} + \frac{1}{\sqrt{2}} = \frac{3}{\sqrt{2}}$$

by option (c)

$$xy\left(\frac{1}{x^2} + \frac{1}{y^2}\right)$$

$$= \frac{3}{\sqrt{2}} \times \frac{3}{\sqrt{2}} \times \left(\frac{2}{9} + \frac{2}{9}\right)$$

$$= \frac{9}{2} \times \frac{4}{9} = 2 = 2 \text{ (Satisfy)}$$

S13. Ans.(b)

Sol.

ATQ,

cosecA + cotA = p ...(i)

And,

$\text{cosec}^2A - \cot^2A = 1$

⇒ (cosecA – cotA) (cosecA + cotA) = 1

⇒ (coscA – cotA) $= \frac{1}{p}$ ..(ii)

⇒ On adding eqn (i) & (ii) we get

$$2\text{cosec}A = p + \frac{1}{p} = \frac{p^2 + 1}{p}$$

⇒ cosecA $= \frac{p^2+1}{2p}$

⇒ sinA $= \frac{2p}{p^2+1}$

S14. Ans.(b)

Sol.

$$\frac{\sin 36°}{\cos 54°} - \frac{\sin 54°}{\cos 36°}$$

$$\frac{\sin(90° - 54°)}{\cos 54°} - \frac{\sin 54°}{\cos(90° - 54°)}$$

$$\frac{\cos 54°}{\cos 54°} - \frac{\sin 54°}{\sin 54°}$$

1 – 1 = 0

S15. Ans.(a)

Sol.

$$\cos(40° - \theta) - \sin(50° + \theta) + \frac{\cos^2 40° + \cos^2 50°}{\sin^2 40° + \sin^2 50°}$$

$$\sin[90° - (40° - \theta)] - \sin(50° + \theta) + \frac{\cos^2 40° + \cos^2(90° - 40°)}{\sin^2 40° + \sin^2(90° - 40°)}$$

$$\sin(50° + \theta) - \sin(50° + \theta) + \frac{\cos^2 40° + \sin^2 40°}{\sin^2 40° + \cos^2 40°}$$

$$0 + \frac{1}{1} = 1$$

S16. Ans.(b)

Sol.

cot 12° cot 38° cot 52° cot 60° cot 78°

(cot 12° cot 78°)(cot 38° cot 52°) (cot 60°)

[cot 12° cot (90° – 12°)] [cot 38° cot (90° – 38°)] cot 60°

(cot 12° tan 12°) (cot 38° tan 38°) cot 60°

$$1 \times 1 \times \frac{1}{\sqrt{3}}$$

S17. Ans.(a)

Sol.

$A + B = 90°$

$\sqrt{\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2 B}{\cos^2 A}}$

$= \sqrt{\frac{\tan A \tan(90 - A) + \tan A \cot(90 - A)}{\sin A \sec(90 - A)} - \frac{\sin^2(90 - A)}{\cos^2 A}}$

$= \sqrt{\frac{\tan A \cot A + \tan A \tan A}{\sin A \operatorname{cosec} A} - \frac{\cos^2 A}{\cos^2 A}}$

$= \sqrt{1 + \tan^2 A - 1}$

$= \tan A$

S18. Ans.(c)

Sol.

$\sec 5A = \operatorname{cosec}(A + 36°)$

$\operatorname{cosec}(90° - 5A) = \operatorname{cosec}(A + 36°)$

$90° - 5A = A + 36°$

$90° = 6A + 36°$

$54° = 6A$

$A = 9°$

S19. Ans.(a)

Sol.

$(\sin\theta + \sec\theta)^2 + (\cos\theta + \operatorname{cosec}\theta)^2$

Put $\theta = 45°$

$\left(\frac{1}{\sqrt{2}} + \sqrt{2}\right)^2 + \left(\frac{1}{\sqrt{2}} + \sqrt{2}\right)^2$

$= 2\left(\frac{1}{\sqrt{2}} + \sqrt{2}\right)^2 = 2\left[\frac{1}{2} + 2 + 2.\frac{1}{\sqrt{2}}.\sqrt{2}\right]$

$= 2 \times \frac{9}{2} = 9$

Put $\theta = 45°$ in option.

Option (a) satisfies.

S20. Ans.(b)

Sol.

$\sin\theta + \cos\theta = p$

$\sec\theta + \operatorname{cosec}\theta = q$

$q(p^2 - 1)$

$= (\sec\theta + \operatorname{cosec}\theta)[(\sin\theta + \cos\theta)^2 - 1]$

$= \left(\frac{1}{\cos\theta} + \frac{1}{\sin\theta}\right)[1 + 2\sin\theta\cos\theta - 1]$

$= \frac{(\sin\theta + \cos\theta)}{(\sin\theta\cos\theta)} \times (2\sin\theta\cos\theta)$

$= 2(\sin\theta + \cos\theta)$

$= 2p$

S21. Ans.(b)
Sol.
Since x = 1 makes $x^{29} - x^{25} + x^{13} - 1$ zero, so (x – 1) is its factor.
And x = -1 does not make it zero
So (x + 1) is not its factor.

S22. Ans.(c)
Sol.
$x^2 + 2 = 2x$
squaring both sides,
$(x^2 + 2)^2 = (2x)^2$
$X^4 + 4 + 4x^2 = 4x^2$
$x^4 = -4$
$x^2 + 2 = 2x$
$x^2 = 2x - 2$
$x^2 = 2(x - 1)$
$x - 1 = \frac{x^2}{2}$
$x^4 - x^3 + x^2 + 5$
Put the value of $x^4 = -4$
$-4 - x^2(x - 1) + 5$
$1 - x^2(x - 1)$
Put the value of (x – 1)
$1 - \frac{x^2 \times x^2}{2}$
$1 - \frac{x^4}{2} = 1 + \frac{4}{2} = 3$

S23. Ans.(a)
Sol.

$x = a^2 + b^2$
Squaring both side,
$x^2 = (a^2 + b^2)^2$
$x^2 = a^4 + b^4 + 2a^2b^2$ ...(i)
$y = \sqrt{2}ab$
$y^2 = 2a^2b^2$ ...(ii)
From (i) and (ii)
$x^2 = a^4 + b^4 + y^2$
$x^2 - y^2 = a^4 + b^4$
now,
Put the value of
$\frac{a^4 + b^4}{a^2 - ab\sqrt{2} + b^2}$
$[(x - y) = a^2 + b^2 - 2\sqrt{ab}]$
$= \frac{x^2 - y^2}{x - y}$
$= \frac{(x+y)(x-y)}{(x-y)} = (x + y)$

S24. Ans.(d)

Sol.

(x – a) (x – b) = 1

$\Rightarrow$ (x – b) = $\frac{1}{(x-a)}$

(x – a) (x – b) = 1 ..(i)

$\because$ a – b + 5 = 0

-b = -a – 5

Put the value (-b) in equation (i)

(x – a) (x- a – 5) = 1

Let (x – a) = M

M(M – 5) = 1

$$M - 5 = \frac{1}{M}$$

$$M - \frac{1}{M} = 5$$

Now,

$$M^3 - \frac{1}{M^3} = 5^3 + 3 \times 5$$

$$M^3 - \frac{1}{M^3} = 140$$

Put the value of M = x -a

So,

$$(x - a)^3 - \frac{1}{(x - a)^3} = 140$$

S25. Ans.(b)

Sol.

Let (x + 3) = m

x + 3 = m

x = m – 3

Put the value of 'x'

$x^2 + x = 5$

$\Rightarrow (m - 3)^2 + (m - 3) = 5$

$\Rightarrow m^2 + 9 - 6m + m - 3 = 5$

$\Rightarrow m^2 - 5m + 1 = 0$

$\Rightarrow m^2 + 1 = 5m$

$\Rightarrow m + \frac{1}{m} = 5$

Now,

$$m^3 + \frac{1}{m^3} = 5^3 - 3 \times 5$$

$$m^3 + \frac{1}{m^3} = 110$$

Put the value of m = x + 3

Then,

$$(x + 3)^3 + \frac{1}{(x + 3)^3} = 110$$

S26. Ans.(c)

Sol.

$x(x-3) = -1$

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

$x + \frac{1}{x} = 3$

$x^3 + \frac{1}{x^3} = 3^3 - 3 \times 3 = 18$

$x^3 - 18 = \frac{-1}{x^3} \qquad .(i)$

Now,

$x^3(x^3 - 18)$

From equation (i)

$x^3 \times \frac{1}{x^3} = -1$

$x^3(x^3 - 18) = -1$

S27. Ans.(b)

Sol.

$(a + b)^2 - c^2 = 21$

$\Rightarrow (a + b + c)(a + b - c) = 21 \qquad ...(i)$

$(b + c)^2 - a^2 = 32$

$\Rightarrow (b + c + a)(b + c - a) = 32 \qquad ...(ii)$

$(c + a)^2 - b^2 = 28$

$\Rightarrow (c + a + b)(c + a - b) = 28 \qquad ...(iii)$

Adding all three equations:-

$\Rightarrow (a + b + c)[(a + b + c) + (b + c + a) + (c + a - -b)] = 81$

$\Rightarrow (a + b + c)^2 = 81$

$\Rightarrow a + b + c = 9$

S28. Ans.(b)

Sol. We know that in this condition a = b = c and given a, b and c are natural no. we take option (b) because 8 = 2 × 2 × 2

We can say that 8 is possible value of a × b × c

S29. Ans.(a)

Sol.

$\sqrt[3]{2 \times 333^3 + 334^3 - 3 \times 333^2 \times 334}$

After describing

$= \sqrt[3]{333^3 + 333^3 + 334^3 - 3 \times 333 \times 333 \times 334}$

$a^3 + b^3 + c^3 - 3abc$
$= \frac{1}{2}(a + b + c)[(a - b)^2] + (b - c)^2 + (c - a)^2$

$= \sqrt{\frac{1}{2}(333 + 333 + 334)[(333 - 333)^2 + (333 - 334)^2 + (334 - 333)^2]}$

$$= \sqrt[3]{\frac{1}{2}\,(1000)(0+1+1)}$$

$$= \sqrt[3]{\frac{1}{2} \times 1000 \times 2} = 10$$

S30. Ans.(d)
Sol.

a + b + c = 0
a + b = -c
Squaring both side
$(a + b)^2 = (-c)^2$
$a^2 + b^2 + 2ab = c^2$
$a^2 + b^2 - c^2 = -2ab$ ...(i)
Same, b + c = -a
$b^2 + c^2 - a^2 = -2bc$ ..(ii)
Thus,
c + a = -b
$c^2 + a^2 - b^2 = -2ac$ ...(iii)
Put the value

$$\frac{1}{a^2+b^2-c^2} + \frac{1}{b^2+c^2-a^2} + \frac{1}{c^2+a^2-b^2}$$

$$\Rightarrow \frac{1}{-2ab} + \frac{1}{-2bc} + \frac{1}{-2ab}$$

$$\frac{a+b+c}{-2abc} = \frac{O}{-2abc} = 0$$